DRAFT ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR FIVE CUMBERLANDIAN MUSSELS

September 2003

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EXECUTIVE SUMMARY

1. The purpose of this report is to identify and analyze the potential economic impacts that may result from the proposed critical habitat designation for the Cumberland elktoe (*Alasmidonta atropurpurea),* oyster mussel (*Epioblasma capsaeformis*), Cumberlandian combshell (*Epioblasma brevidens*), purple bean (*Villosa perpurpurea*), and rough rabbittsfoot (*Quadrula cylindrica strigillata*), hereafter referred to as the mussels. This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service's (Service) Division of Economics, and delivered on June 6, 2003.

2. Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

Framework for the Analysis

3. The primary purpose of this analysis is to estimate the economic impact that will result from the designation of critical habitat for the mussels.[1] This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[2] This economic analysis considers the economic efficiency effects that may result from the designation and addresses how the impacts of the designation are distributed, including an assessment of any local or regional economic impacts of the designation and the potential effects of the designation on small entities, the energy industry, or governments. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector.

4. OMB guidelines for conducting economic analysis of environmental regulation direct Federal agencies to measure the costs of a regulatory action against a baseline.[3] The baseline includes the currently existing regulatory and socio-economic burden imposed on landowners

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[1] This analysis considers the effects of the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33234).

[2] 16 U.S.C. § 1533(b)(2).

[3] U.S. Office of Management and "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003; and U.S. Office of Management and Budget, "Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements," in *Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

and managers potentially affected by the designation of critical habitat including, for example, local zoning laws, State natural resource laws, and enforceable management plans and best management practices applied by other State and Federal agencies. Existing laws, regulations, and policies that offer baseline protections to the mussels are described in greater detail in Section 2 and Appendix B of this analysis.

5. This analysis describes impacts that are expected to occur above and beyond the baseline. In other words, it measures the costs of compliance with the Act that would not occur in the absence of the currently proposed critical habitat. While costs associated with section 9 and 10 of the Act are considered related to the designation of critical habitat they were not considered as there were no available data.

6. The measurement of direct compliance costs focuses on the implementation of section 7 of the Act. This section requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent the direct compliance costs of designating critical habitat. *Importantly, this analysis does not differentiate between consultations that result from the listing of the species (i.e., the jeopardy standard) and consultations that result from the presence of critical habitat (i.e., the adverse modification standard).*

7. The designation may, under certain circumstances, affect actions that do not have a Federal nexus or are otherwise not subject to the provisions of section 7 under the Act. For the purposes of this analysis, these impacts are defined as indirect effects. For example, although technical assistance is not a direct cost of section 7 of the Act, these costs are incorporated into the cost analysis when they are explicitly propagated by consideration of species and habitat conservation. Similarly, a State agency may request technical assistance from the Service as a precaution to ensure that activities without a Federal nexus, such as the issuance of National Pollutant Discharge Elimination System (NPDES) permits, adequately provide for particular species and habitats. In this case, costs of Service review of such activities would be included as a cost of critical habitat designation.

8. The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a ten year time frame, beginning on the day that the current proposed rule becomes available to the public. The ten-year time frame was chosen for the analysis because, as the time horizon for an economic analysis is expanded, the assumptions on which the projected numbers of projects are based become increasingly speculative.

9. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of the proposed designation. The steps followed in this analysis consist of:

- Describing current and projected economic activity within and around the proposed critical habitat area;
- Identifying whether such activities are likely to involve a Federal nexus;
- For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
- Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts associated with the designation;
- Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the proposed designation;
- Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;
- Estimating the likelihood that economic activity will be affected by regulatory uncertainty, and/or property values affected;
- Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, including private property values;
- Assessing the extent to which critical habitat designation will create costs for small businesses as a result of modifications or delays to projects;
- Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and
- Determining the benefits that may be associated with the designation of critical habitat.

Key Findings

10. The Service has determined that the French Broad River, Holston River, and the Rockcastle River are essential to the conservation of the mussels. However, based on the Service's analysis under section 4(b)(2) of the Act, defined above, these areas have been proposed for exclusion from designation of critical habitat for the mussels.[4] This report analyzes the costs of both the lands proposed for designation and the lands proposed for exclusion because a decision to exclude an area according to section 4(b)(2) of the Act requires thorough consideration of "the economic impact, and any other relevant impact" of designating critical habitat.

11. This analysis forecasts approximately 700 to 900 informal and approximately 100 formal section 7 consultations regarding the mussels over the next ten years. Most of the cost of this designation (79 percent) is comprised of the administrative costs associated with consultations. Few project modifications are expected to result from these projected consultations, as current State and Federal regulations provide a high level of baseline protection.

12. Estimates of the economic impact associated with section 7 consultations for the mussels, discounted to present value using a rate of seven percent, range from $4.2 million to $11.2 million over ten years (or $0.6 million to $1.6 million annually).[5] While a range of activities may be affected by the designation of critical habitat for the mussels, the activities most impacted by the designation are road/bridge construction and maintenance projects (37 percent) and national forest activities (22 percent). The remaining costs are associated with agriculture (nine percent), utilities (eight percent), water quality (seven percent), technical assistance (five percent), oil and gas drilling (four percent), conservation and recreation (three percent), gravel dredging (two percent), coal mining (one percent), and national park activities (one percent). Exhibit ES-1 highlights the relative contributions of each land use activity to total section 7 costs. Impacts reported in this exhibit result from administrative costs associated with the section 7 consultation process and related project modifications.

13. Road and bridge construction and maintenance is the activity most impacted by the designation. The total cost of road and bridge construction and maintenance ($6.0 million) is less than one-tenth of one percent of the total annual operating budget of affected State

[4] This analysis considers the effects of the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33234). See the proposed rule for a complete discussion of the proposed exclusion.

[5] These estimates have been converted to present values using a seven percent discount rate and include impacts that are co-extensive with other aspects of section 7 of the Act (see Exhibit 4-4). Costs in the present value calculation are distributed evenly over the ten year time frame as Action agencies were unable to provide specific timing of expected consultations.

departments of transportation ($7.3 billion).[6] The highest per project cost ($125,000) is approximately one percent of the average bridge project cost ($11.7 million).[7]

14. The mussel critical habitat area is characterized by mostly private rural, and some suburban, lands. Agriculture is a common land use in the region, suggesting that farmers could experience costs as a result of the designation. However, based on extensive review of the consultation history and interviews with Federal and State agencies, the economic impacts to farmers are expected to be minimal, as approximately 62 percent of the section 7 costs for agricultural activities are not borne by the third party. Since agricultural consultations primarily involve Federal assistance for conservation programs (i.e., the Environmental Quality Incentives Program), any consultations associated with these activities are not likely to result in significant project modifications.

15. Exhibit ES-1 provides a graphical representation of the relative contributions of each land use activity to the total anticipated consultation costs. The lower section of each bar in this exhibit represents the administrative cost and the top portion the project modification cost.

16. Exhibit ES-2 is a graphical presentation of the total estimated consultation, technical assistance and project modification costs likely to be associated with the listing and proposed critical habitat designation for the mussels, by unit or area, over the next ten-years.

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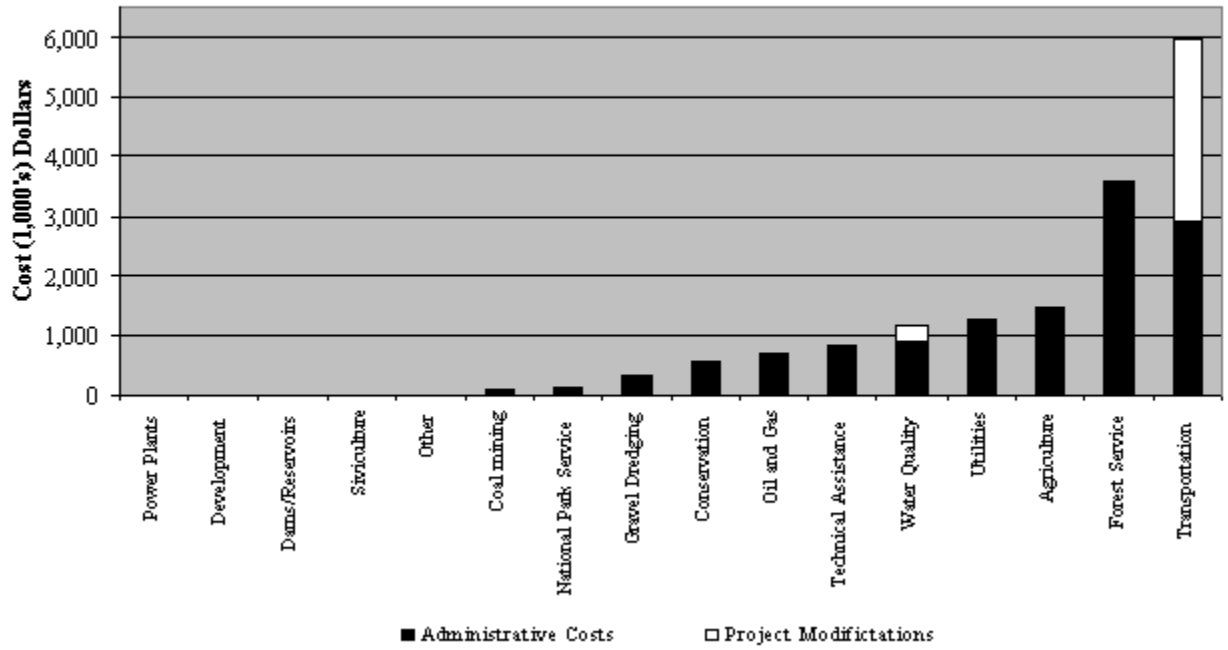
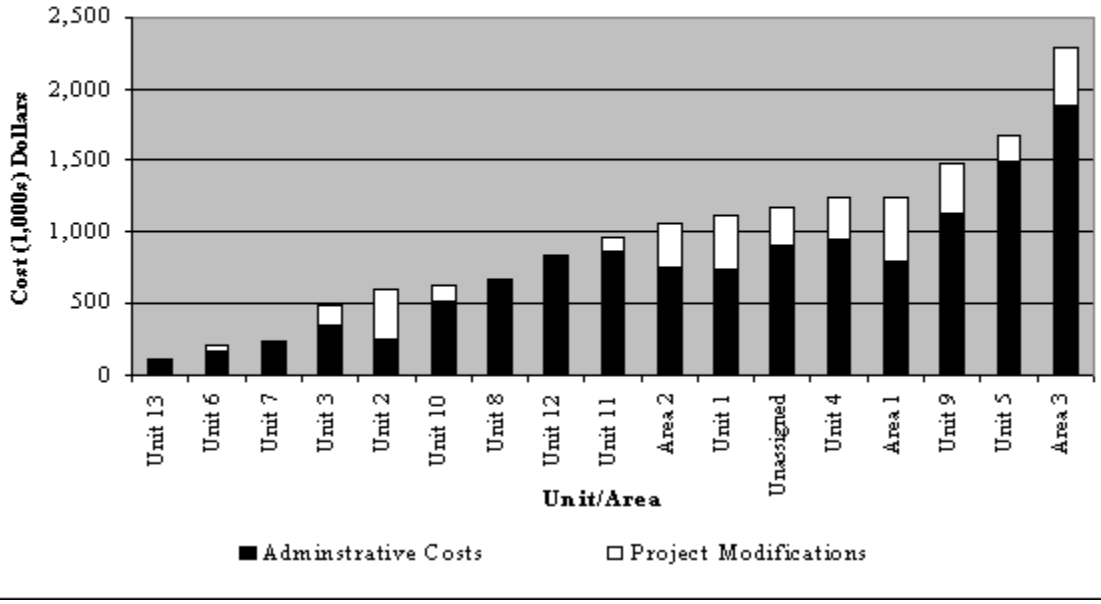
[6] Tennessee Department of Transportation. Governor's Highway Work Program Reflects State Budget Reductions. Accessed at http://www.tdot.state.tn.us/roadprojects/statewide.htm, June 2, 2003. Virginia Department of Transportation. 2003. Virginia Department of Transportation Annual Budget Fiscal Year 2003-2004. Accessed at http://www.virginiadot.org/infoservice/resources/fin-04budget-tentative.pdf, June 2, 2003. Kentucky Transportation Cabinet. 2002. Revenue Assumptions For FY 2003-2008 Six Year Highway Program. Accessed at http://www.kytc.state.ky.us/progmgmt/2002-syp/Revenue_Assumptions.pdf, June 2, 2003. Alabama Department of Transportation. 2000. Alabama Statewide Transportation Plan. Accessed at http://www.dot.state.al.us/transplanning/stateplan.pdf, June 2, 2003. Mississippi Department of Transportation. 2002. Annual Report 2002. Accessed at http://www.gomdot.com/news/annual_reports/fy_2002_annual_report/02_financials.pdf, June 2, 2003.

[7] Kentucky Transportation Cabinet. 2002. Kentucky Transportation Cabinet 2002 Six Year Highway Plan FY - 2002 Thru FY - 2008.

EXHIBIT ES-1
CONSULTATION COSTS BY ACTIVITY TYPE
(TEN YEARS)



EXHBIT ES-2
CONSULTATION COSTS BY UNIT/AREA
(TEN YEARS)



17. Exhibit ES-3 provides a summary of the total estimated consultation, technical assistance and project modification costs associated with the listing and proposed critical habitat designation for the mussels by activity over the next ten years. The low and the high scenarios are driven by uncertainty in estimating future consultations and associated project modification costs.

18. Exhibit ES-4 provides a more detailed summary of the total estimated consultation, technical assistance and project modification costs likely to be associated with the listing and proposed critical habitat designation for the mussels by unit over the next ten-years. Most of these costs are in Area 3 Rockcastle River (14 percent). The high costs in Area 3 Rockcastle River are due primarily to the presence of Daniel Boone National Forest. The Daniel Boone National Forest consultations with the Service are comprehensive, with every consultation addressing all 32 threatened and endangered species occurring in the forest regardless of impact. The cost of these consultations may be reduced in the future as consultation requirements become more clear and are streamlined.

19. After Area 3 most of the costs are in Unit 5 Clinch River (11 percent), Unit 9 Big South Fork (nine percent), Area 1 French Broad River (eight percent), and Unit 4 Powell River (eight percent). No one activity is driving the unit or area costs, high costs are attributable to the size of the unit or area. Unit 5 Clinch River, Unit 9 Big South Fork, Area 2 Holston River, and Unit 4 Powell River are the largest four units and areas.

20. Exhibit ES-5 provides an overview of the present value of total section 7 costs associated with the listing and designation of critical habitat for the mussels over a ten year period. The present value of total section 7 costs, applying a seven percent discount rate, is $4 million to $11 million, or $0.6 million to $1.6 million annually.

Exhibit ES-3

ESTIMATED TOTAL ECONOMIC COSTS OF ASSOCIATED ACTIVITIES (TEN YEARS)

Activity	No. of Informal/ Formal Consultations	Informal Consultation	Formal Consultation	Project Modifications	Total Costs
Transportation	110/62	$160,000 to $1,490,000	$850,000 to $1,440,000	$1,590,000 to $3,050,000	$2,600,000 to $5,990,000
Forest Service	200/10	$1,030,000 to $3,340,000	$0 to $240,000	$0	$1,030,000 to $3,570,000
Agriculture	237/12	$650,000 to $1,190,000	$80,000 to $260,000	$0	$740,000 to $1,450,000
Utilities	120/4	$170,000 to $1,150,000	$10,000 to $90,000	$40,000	$220,000 to $1,280,000
Water Quality	36/7	$120,000 to $710,000	$70,000 to $190,000	$180,000 to $250,000	$370,000 to $1,150,000
Oil and Gas Drilling	50/0	$480,000 to $680,000	$0	$0	$480,000 to $680,000
Conservation and Recreation	84/1	$110,000 to $520,000	$10,00 to $20,000	$0	$120,000 to $540,000
Gravel Dredging	5/11	$10,000 to $70,000	$70,000 to $240,000	$0	$80,000 to $310,000
National Park Service	8/1	$20,000 to $100,000	$10,000 to $20,000	$0	$30,000 to $120,000
Coal Mining	24/0	$30,000 to $80,000	$0	$0	$30,000 to $80,000
Development	0/0	$0	$0	$0	$0
Dams/Reservoirs	0/0	$0	$0	$0	$0
Power Plants	0/0	$0	$0	$0	$0
Silviculture	0/0	$0	$0	$0	$0
Other	0/1	$6,000 to $10,000	0	0	$6,000 to $10,000
Technical Assistance					$280,000 to $800,000
TOTAL	**874/109**	**$2,760,000 to $9,330,000**	**$1,130,000 to $2,510,000**	**$1,800,000 to $3,340,000**	**$5,980,000 to $16,000,000**

Note: Numbers may not sum due to rounding. Other costs include the TVA programmatic consultation.
Source: Based on past consultation records and conversations with Federal agencies potentially affected by the proposed critical habitat designation.

Exhibit ES-4

ESTIMATED TOTAL ECONOMIC COSTS OF SECTION 7 BY UNIT AND AREA (TEN YEARS)

Units	No. of Informal/Formal Consultations[a]	Technical Assistance	Informal Consultation	Formal Consultation	Project Modification Costs	Total Costs[b]
1 Duck River	50/9	$0	$50,000 to $530,000	$110,000 to $210,000	$30,000 to $370,000	$190,000 to $1,100,000
2 Bear Creek	14/2	$10,000 to $50,000	$20,000 to $140,000	$20,000 to $50,000	$310,000 to $350,000	$360,000 to $590,000
3 Obed River	48/2	$0	$120,000 to $310,000	$10,000 to $40,000	$10,000 to $140,000	$140,000 to $490,000
4 Powell River	46/19	$0 to $10,000	$110,000 to $480,000	$310,000 to $470,000	$230,000 to $290,000	$660,000 to $1,250,000
5 Clinch River	74/14	$180,000 to $460,000	$180,000 to $680,000	$220,000 to $350,000	$150,000 to $180,000	$740,000 to $1,680,000
6 Nolichucky River	16/1	$0	$10,000 to $140,000	$10,000 tp $30,000	$0 to $30,000	$20,000 to $200,000
7 Beech Creek	36/0	$0	$100,000 to $210,000	$0	$0 to $20,000	$100,000 to $230,000
8 Rock Creek	35/3	$0 to $10,000	$190,000 to $570,000	$0 to $80,000	$0	$190,000 to $660,000
9 Big South Fork	93/6	$0	$550,000 to $990,000	$70,000 to $130,000	$210,000 to $350,000	$830,000 to $1,480,000
10 Buck Creek	30/15	$0 to $10,000	$60,000 to $180,000	$110,000 to $330,000	$100,000	$270,000 to $610,000
11 Sinking Creek	52/8	$0 to $10,000	$230,000 to $670,000	$40,000 to $190,000	$100,000	$370,000 to $970,000
12 Marsh Creek	52/7	$0	$230,000 to $670,000	$30,000 to $170,000	$0	$260,000 to $840,000
13 Laurel Fork	14/0	$0 to $20,000	$50,000 to $100,000	$0	$0	$50,000 to $120,000
Unassigned[c]	35/1	$60,000 to $150,000	$120,000 to $690,000	$10,000 to $30,000	$110,000 to $150,000	$290,000 to $1,010,000
Subtotal	**594/88**	**$250,000 to $720,000**	**$2,020,000 to $6,3600,000**	**$940,000 to $2,080,000**	**$1,250,000 to $2,080,000**	**$4,470,000 to $11,230,000**

Exhibit ES-4

ESTIMATED TOTAL ECONOMIC COSTS OF SECTION 7 BY UNIT AND AREA (TEN YEARS)

Units	No. of Informal/Formal Consultations[a]	Technical Assistance	Informal Consultation	Formal Consultation	Project Modification Costs	Total Costs[b]
Areas						
1 French Broad River	87/12	$0	$130,000 to $550,000	$70,000 to $240,000	$50,000 to $460,000	$250,000 to $1,260,000
2 Holston River	88/5	$0	$130,000 to $660,000	$50,000 to $90,000	$40,000 to $310,000	$210,000 to $1,070,000
3 Rockcastle River	105/4	$20,000 to $50,000	$470,000 to $1,740,000	$60,000 to $90,000	$400,000	$950,000 to $2,280,000
Unassigned[b]	1/1	0	$10,000 to $20,000	$10,000 to $30,000	$70,000 to $100,000	$90,000 to $150,000
Subtotal	**281/14**	**$20,000 to $50,000**	**$740,000 to $2,970,000**	**$190,000 to $450,000**	**$560,000 to $1,270,000**	**$1,500,000 to $4,750,000**
TOTAL	**874/109**	**$270,000 to $770,000**	**$2,760,000 to $9,330,000**	**$1,130,000 to $2,530,000**	**$1,810,000 to $3,350,000**	**$5,980,000 to $16,000,000**

[a] Maximum number of informal and formal consultations.
[b] Technical assistance costs are allotted by unit based on the distribution of formal and informal consultations. These costs are included in Total Costs only.
Note: Totals may not sum due to rounding.
[c] Unassigned costs include Special Appropriation Projects and Technical Assistance.

Exhibit ES-5

SECTION 7 AND TECHNICAL ASSISTANCE COSTS ASSOCIATED WITH THE LISTING AND DESIGNATION OF CRITICAL HABITAT FOR THE MUSSELS

	Total Section 7 Costs	
	Low	High
Nominal value of total section 7 costs (ten years)	$6.0 million	$16.0 million
Present Value (7%)	$4.2 million	$11.2 million
Annualized (7%)	**$0.6 million**	**$1.6 million**

Note: This table presents nominal costs as well as the discounted present value of total costs based on a seven percent discount rate with the assumption that total costs are distributed evenly over the ten-year period. Discounted costs are then annualized assuming that total costs will be evenly distributed across the ten-year period. These estimates include all section 7 costs, including both those associated with the species listing and designation of critical habitat for the mussels.

Costs By Major Activity

21. The following discussion summarizes the activities anticipated to experience impacts due to designation of critical habitat for the mussels. Federal agencies that may consult with the Service concerning these activities include: the Army Corps of Engineers (USACE), Natural Resources Conservation Service (NRCS), the Federal Energy Regulatory Commission (FERC), the Federal Highway Administration (through State Departments of Transportation (DOT)), U.S. Environmental Protection Agency (EPA), the Tennessee Valley Authority (TVA), and the U.S. Forest Service (USFS).

- **Road and bridge construction or maintenance.** This analysis anticipates that transportation-related projects will bear the greatest portion, 37 percent, of the designation costs. State DOTs, the USACE, and the TVA are expected to engage in up to 110 informal, and 62 formal section 7 consultations regarding road/bridge construction and maintenance projects at a total cost of approximately $2.6 million to $6.0 million over the next ten years. Modifications to these projects may include such measures as strengthening standards for erosion and sedimentation control, restricting in-stream construction, surveying for species, and relocating species for the duration of the project period. The most cost-intensive modification ($100,000 per project) is increasing the span of bridges to avoid construction in the stream.

- **National Forest Activities.** This analysis anticipates that land disturbance activities in national forests, such as silviculture, prescribed burnings, or trail construction and maintenance, may result in 200 informal and ten formal consultations over the next ten years. The total estimated costs of these consultations range from $1.0 million to $3.6 million, or 22 percent of the

total designation costs. Consultations associated with such activities are not expected to result in project modification. Third party involvement in these consultations is not expected. The USFS is expected to bear approximately 97 percent of the costs of consultations regarding activities within National Forests.

- **Agriculture or Ranching-Related Activities.** Agricultural or ranching activities that involve a Federal nexus may result in up to 237 informal and 12 formal consultations at a total cost of $0.7 million to $1.5 million over the next ten years. This accounts for approximately nine percent of the total costs of the designation. The NRCS serves as the primary Action agency for these consultations through conservation partnership programs with private landowners. Typical activities include streambank stabilization, and construction of stream crossings for livestock. The USACE and TVA are also anticipated to engage in similar conservation projects in their jurisdictions within critical habitat. As these activities are intended to improve agricultural practices to benefit habitats, no project modifications are anticipated.

- **Utilities Construction and Maintenance.** FERC, USACE, and TVA engage in construction, maintenance, or permitting of in-stream pipelines, transmission lines, and other utility infrastructure. These activities are anticipated to result in up to 120 informal and four formal consultations at a total cost of up to $1.3 million over the next ten years, or eight percent of the total cost of this designation. Extended review of TVA electrical transmission line projects may result in project modification costs of $40,000.

- **Water Quality Activities.** EPA engages in section 7 consultation with the Service regarding water quality standards, to ensure that they are appropriately protective of endangered and threatened species. Specifically, this analysis anticipates 36 informal consultations and seven formal consultations with the EPA related to water quality activities. Potential project modifications include mussel surveys and relocation and may cost up to $0.3 million. The total section 7 costs of water quality consultations is anticipated to cost up to $1.2 million over the next ten years, accounting for approximately seven percent of the cost of the designation. Further, the Service may provide technical assistance for review of NPDES permits approximately 108 times over the next ten years, adding $40,000 to $160,000 in administrative costs (one percent of total designation costs).

- **Oil and Gas Development.** Oil and gas drilling within Tennessee and Kentucky are permitted by the States; no Federal nexus exists. However, the National Park Service (NPS) consults with the Service regarding oil and gas drilling projects inside National Park boundaries within the designation. This

analysis anticipates up to 50 informal consultations at a cost of $0.7 million (four percent of the designation costs) for drilling activities in National Parks over the next ten years.

- **Recreation and Conservation Activities.** Recreation and conservation activities on private land may involve a Federal nexus through Federal funding from the Service's Partners for Fish and Wildlife program. The USACE and TVA may also engage in habitat restoration projects. Private recreation activities include boat ramp construction, which may involve a Federal nexus through permitting from USACE and/or TVA. This analysis anticipates up to 84 informal and one formal consultation with respect to conservation and recreation projects at a total cost of $0.1 million to $0.5 million over the next ten years. This accounts for approximately three percent of the total designation costs. Although these activities are federally funded and therefore a cost of critical habitat due to the requirements of section 7, such activities are intended to be beneficial to the species and habitat in the long run.

- **Gravel Dredging.** The USACE anticipates engaging in five informal and 11 formal consultations regarding Section 10 permitting of dredge activities over the next ten years. As such activities occur in small streams and are subject to USACE best management practices (called General Conditions), no project modifications are anticipated. The total section 7 cost of dredging activities is expected to range from $0.1 million to $0.3 million, or two percent of the total cost of the designation.

- **National Park Activities.** The National Park Service (NPS) consults with the Service regarding it's activities within critical habitat, such as bridge and trail maintenance and review of the General Management Plan. These activities are anticipated to engender eight informal and one formal consultation over the next ten years for a total of $0.1 million, or one percent of total cost of the designation. No project modifications are anticipated due to existing protective provisions within the management plan.

- **Coal Mining.** The States of Kentucky and Virginia have been granted regulatory authority to issue permits for coal mining, therefore, no Federal nexus exists. Technical assistance efforts to ensure permits adequately provide for the mussels, however, are anticipated to cost up to $0.5 million during the next ten years (three percent of total costs). In Tennessee, the Office of Surface Mining (OSM) issues coal mining permits and must consult with the Service regarding permit actions. Approximately 24 informal consultations are anticipated for permit review in Tennessee over the next ten years at a total cost of $0.1 million, or less than one percent of total cost of the designation.

22. Service technical assistance efforts for private landowners are anticipated to result in an additional $0.2 million in administrative costs, accounting for another one percent of total designation costs. Land use activities that occur within the designation, but are not anticipated to be economically effected by designation of critical habitat include: residential development, hydropower, water supply dams, and silviculture. This analysis discusses these activities in the context of critical habitat in detail in Section 4.2 of this analysis.

Benefits Associated with the Designation

23. Various categories of benefit may derive from the listing of the mussels and the designation of critical habitat. For example, survival and conservation of the species may lead to enhanced existence values. In addition, protection of mussel habitat may produce benefits such as preservation of habitat suitable for recreational uses, improved water quality, and habitat improvement for other species.

24. Insufficient information exists to quantify the benefits of habitat protection. Several studies published in the economics literature, however, have attempted to estimate the public's willingness to pay for the designation of critical habitat for endangered species. While these studies do not predict the willingness to pay individuals would have for the protections afforded to the mussels' habitat through critical habitat designation, they support the notion that preservation of mussel habitat may generate substantial benefits to the public.

25. Exhibit ES-6 presents the key assumptions of this economic analysis, as well as the potential direction of bias introduced by each assumption. For example, the analysis assumes that the frequency of consultations will continue at historical rates in the future. There is, however, some indication that consultation and technical assistance efforts may decline in the future, reducing the ultimate cost of the designation.

Exhibit ES-6

CAVEATS TO THE ECONOMIC ANALYSIS

Key Assumption	Effect on Cost Estimate
The rate of formal and informal consultations will not decrease over time.	+
The presence of other threatened and endangered species with and without critical habitat (i.e., spotfin chub, yellowfin madtom, slender chub, etc.) has no influence on consultation/project modification costs.	+
The historic occurrence and cost of project modifications are good predictors of future consultation costs.	+/-
Action agency Best Management Practices are baseline protections that are practiced consistently and as such, do not introduce additional costs to section 7 consultations.	+/-
All costs to development are captured by increased costs of construction of pipelines, water supply and wastewater infrastructure, and roads and bridges within the proposed critical habitat.	+/-

- : This assumption may result in an underestimate of real costs.
+ : This assumption may result in an overestimate of real costs. Multiple "+" keys refer to the magnitude of effect anticipated.
+/- : This assumption has an unknown effect on estimates.

26. The above caveats describe factors that introduce uncertainty into the results of this analysis. The Service therefore solicits from the public further information on any of the issues presented above. Additionally, information pertaining to the following is requested.

- Are data available to develop more accurate estimates of the number of future consultations and type and cost of project modifications for:
  - road/bridge construction and maintenance;
  - NRCS projects;
  - oil and gas drilling;
  - coal mining; and/or
  - agriculture.

- Are data available detailing additional, specific benefits of the species or habitat that may be incorporated qualitatively or quantitatively into the discussion of benefits?

27. In May 2003, the U.S. Fish and Wildlife Service (Service) proposed to designate critical habitat for the Cumberland elktoe (*Alasmidonta atropurpurea*), oyster mussel (*Epioblasma capsaeformis*), Cumberlandian combshell (*Epioblasma brevidens*), purple bean (*Villosa perpurperea*), and rough rabbittsfoot (*Quadrula cylindrica strigillata*), hereafter mussels, on various portions of 13 rivers in Tennessee, Kentucky, Virginia, Mississippi, and Alabama. The purpose of this report is to identify and analyze potential economic impacts that may result from the proposed critical habitat designation. This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service's (Service) Division of Economics, and delivered on June 2, 2003.

28. Section 4(b)(2) of the Act requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

29. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

1.1 Description of Species and Habitat[8]

Cumberland Elktoe

30. The Cumberland elktoe is endemic to the upper Cumberland River system in southeast Kentucky and north-central Tennessee. It appears to have historically occurred only in the main stem of the Cumberland River and primarily its southern tributaries upstream from the hypothesized original location of Cumberland Falls near Burnside, Pulaski County, Kentucky. Based on recent records, populations of the Cumberland elktoe continues to persist in 12 Cumberland River tributaries: Laurel Fork, Claiborne County, Tennessee and Whitley County, Kentucky; Marsh Creek, McCreary County, Kentucky; Sinking Creek, Laurel County, Kentucky; Big South Fork, Scott County, Tennessee, and McCreary County, Kentucky; Rock Creek, McCreary County, Kentucky; North Fork White Oak Creek, Morgan and Fentress County, Tennessee; Clear Fork, Fentress, Morgan, and Scott Counties, Tennessee; North Prong Clear Fork and Crooked Creek, Fentress County, Tennessee; White Oak Creek, Scott County, Tennessee; Bone Camp Creek, Morgan County, Tennessee; and the New River, Scott County, Tennessee.

Oyster Mussel

31. The oyster mussel was one of the most widely distributed Cumberlandian mussel species with historical records from six States (Alabama, Georgia, Kentucky, North Carolina, Tennessee, and Virginia. This species is now only extant in a handful of stream and river reaches in four States in the Tennessee and Cumberland River systems, including the Duck River in Maury and Marshall Counties, Tennessee; Powell River, Claiborne and Hancock Counties, Tennessee and Lee County, Virgina; Clinch River in Hancock County, Tennessee, and Scott, Russell, and Tazewell Counties, Virginia; Nolichucky River in Hamblen and Cocke Counties, Tennessee; and Big South Fork of the Cumberland River in McCreary County, Kentucky, and Scott County, Tennessee.

Cumberlandian Combshell

32. This species, like the oyster mussel, was once widely distributed, historically occurring throughout the Cumberlandian Region in five States (Alabama, Kentucky, Mississippi, Tennessee, and Virginia). It is now restricted to 5 stream and river reaches. The Cumberlandian combshell persist in Bear Creek, Colbert County, Alabama, and Tishomingo County, Mississippi; Powell River, Claiborne and Hancock Counties, Tennessee, and Lee County, Virginia; Clinch River, Hancock County, Tennessee, and Scott, Russell, and Tazewell Counties, Virginia; Big South Fork, Scott County, Tennessee and McCreary County, Kentucky; and Buck Creek, Pulaski County, Kentucky.

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[8] Information on the mussels and their habitat is taken from the *Proposed Designation of Critical Habitat for the Five Cumberlandian Mussels*, published on June 3, 2003 (68 FR 33243).

Purple Bean

33. The purple bean is endemic to the upper Tennessee drainage in Tennessee and Virginia. Its historical range included the Powell River in Lee County, Virginia; the Clinch River system in Claiborne, Grainger, and Hancock Counties, Tennessee, and Russell, Scott, Tazewell, and Wise Counties, Virginia; the Emory and Obed Rivers in Morgan and Cumberland Counties, Tennessee; and the Holston River System in Hawkins and Sullivan Counties, Tennessee, and Scott and Washington Counties, Virginia. The purple bean persists in the Clinch River mainstem, Hancock County, Tennessee, and Russell, Scott, and Tazewell Counties, Virginia; Copper Creek (a Clinch River tributary) in Scott County, Virginia; and Indian Creek (a Clinch River tributary) in Tazewell County, Virginia; Obed River in Morgan and Cumberland Counties, Tennessee; and in Beech Creek, a tributary of the Holston River in Hawkins County, Tennessee.

Rough Rabbitsfoot

34. Like the purple bean, this species is endemic to the upper Tennessee River system. The rough rabbitsfoot historically occupied the Powell River in Hancock and Claiborne Counties, Tennessee, and Lee County, Virginia; the Clinch River system in Claiborne and Hancock Counties, Tennessee, and Russell, Scott, and Tazewell Counties, Virginia; and the Holston River System in Hawkins and Sullivan Counties, Tennessee, and Scott and Washington Counties, Virginia. It also currently persists in portions of the Powell River, Hancock and Claiborne Counties, Tennessee, and Lee County, Virginia; Clinch River in Hancock County, Tennessee, and Russell, Scott, and Tazewell Counties, Virginia; and in Indian Creek, Tazewell County, Virginia.

35. Human-induced alterations to aquatic environments in the Cumberlandian Region, including channel modifications (e.g., dams, dredging, mining) and historic or episodic water pollution events, have eliminated these species from significant portions of the rivers and streams that they historically occupied. Current threats include continued habitat loss and fragmentation, cumulative effects of land use activities on aquatic environments, population isolation and associated deleterious effects such as inbreeding depression, competition with invasive exotic mussel species, and non-point source pollution.

36. In determining which areas to propose as critical habitat, the Service must focus on those physical and biological features that are essential to the conservation of the species and that may require special management consideration or protection. These essential features are referred to as the species' primary constituent elements (PCEs). The following are the PCEs that the Service has identified as essential to the conservation of the mussels:

- Permanent, flowing stream reaches with a flow regime (i.e, the magnitude, frequency, duration, and seasonality of discharge over time) necessary for normal behavior, growth, and survival of all life stages of the five mussels and their host fish.

- Geomorphically stable stream and river channels and banks (structurally stable stream cross section).

- Stable substrates, consisting of mud, sand, gravel, and/or cobble/boulder, with low amounts of fine sediments or attached filamentous algae.

- Water quality (including temperature, turbidity, oxygen content, and other characteristics) necessary for the normal behavior, growth, and survival of all life stages of the five mussels and their host fish.

- Fish hosts with adequate living, foraging, and spawning areas for them.

1.2 Proposed Critical Habitat[9]

37. The proposed designation includes 13 geographic units that include rivers and streams in the Tennessee and Cumberland River Basins as critical habitat for these five mussel species. Three areas were also identified as essential to the conservation of the mussels in the Tennessee and Cumberland River Basins. These 13 geographic units and three areas essential to the conservation of the mussels (Areas) encompass a total of approximately 1,025 river kilometers (rkm) (625 river miles (rmi)). The critical habitat units described below include the stream and river channels within the ordinary high water line.[10] All of the proposed critical habitat units are currently occupied by at least one of the mussel species. Approximately 78 percent of stream channels proposed as critical habitat are bordered by private lands, 18 percent are bordered by Federal lands, and four percent are bordered by State lands. A more detailed description of each critical habitat unit and area is provided in Exhibit 1-1.

38. The Service has determined that the French Broad River, Holston River, and the Rockcastle River are essential to the conservation of the mussels. However, these areas have been proposed for exclusion from designation of critical habitat for the mussels.[11] These three areas are included in this economic analysis, as described in the executive summary. A more detailed description of each area essential to the conservation of the species is also provided in Exhibit 1-1.

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[9] Information on the mussels and their habitat is taken from the *Proposed Designation of Critical Habitat for the Five Cumberlandian Mussels*, published on June 3, 2003 (68 FR 33243).

[10] The ordinary high water line on nontidal rivers is the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas.

[11] This analysis considers the effects of the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33234). See the proposed rule for a complete discussion of the proposed exclusion.

Exhibit 1-1

DESCRIPTION OF CRITICAL HABITAT UNITS AND AREAS ESSENTIAL TO THE CONSERVATION OF THE MUSSELS

	Description	Species	State(s)	River Miles
Units				
Unit 1: Duck River	Unit 1 consists of the mainstem of the Duck River from river kilometer (rkm) 214 (river mile (rmi) 133), (0.3 rkm (0.2 rmi) upstream of the First Street Bridge) in the City of Columbia, Maury County, Tennessee, upstream to Lillards Mill Dam at rkm 288 (rmi 179) in Marshall County, Tennessee.	oyster mussel, Cumberlandian combshell	TN	46
Unit 2: Bear Creek	Unit 2 includes the mainstem of Bear Creek from the backwaters of Pickwick Lake at rkm 37 (rmi 23), Colbert County, Alabama, upstream through Tishomingo County, Mississippi, ending at the Mississippi/Alabama State line.	oyster mussel, Cumberlandian combshell	AL, MS	25
Unit 3: Obed River	Unit 3 begins at the confluence of the Obed with the Emory River in Morgan County, Tennessee, and continues upstream to Adams Bridge in Cumberland County, Tennessee.	purple bean	TN	25
Unit 4: Powell River	Unit 4 includes the Powell River from the U.S. 25E Bridge in Claiborne County, Tennessee, upstream to rmi 159 (upstream of Rock Island in the vicinity of Pughs) in Lee County, Virginia.	Cumberlandian combshell, rough rabbitsfoot, purple bean, oyster mussel	TN, VA	94
Unit 5: Clinch River and tributaries	Unit 5 consists of the Clinch River from rkm 255 (rmi 159) immediately below Grissom Island, Hancock County, Tennessee, upstream to its confluence with Indian Creek in Cedar Bluff, Tazewell County, Virginia; 4 rkm (2.5 rmi) of Indian Creek from its confluence with the Clinch River upstream to the fourth Norfolk Southern Railroad crossing at Van Dyke, Tazewell County, Virginia; and 21 rkm (13 rmi) of Copper Creek from its confluence with the Clinch River upstream to Virginia State Route 72, Scott County, Virginia.	Cumberlandian combshell, rough rabbitsfoot, oyster mussel, purple bean	TN, VA	171
Unit 6: Nolichucky River	Unit 6 consists of the mainstem of the Nolichucky River and extends from rkm 14 (rmi 9) (approximately 0.6 rkm (0.4 rmi) upstream of Enka Dam) to Susong Bridge in Hamblen and Cocke Counties, Tennessee.	oyster mussel, Cumberlandian combshell	TN	5
Unit 7: Beech Creek	Unit 7 extends from rkm 4 (rmi 2) of Beech Creek (in the vicinity of Slide, TN) upstream to the dismantled railroad bridge at rkm 27 (rmi 16).	purple bean	TN	14

Exhibit 1-1

DESCRIPTION OF CRITICAL HABITAT UNITS AND AREAS ESSENTIAL TO THE CONSERVATION OF THE MUSSELS

	Description	Species	State(s)	River Miles
Unit 8: Rock Creek	Unit 8 consists of the mainstem of Rock Creek and begins at the Rock Creek/ White Oak Creek confluence and extends upstream to Dolen Branch rkm 18 (rmi 11) in McCreary County, Kentucky.	Cumberland elktoe	KY	7
Unit 9: Big South Fork and tributaries	Unit 9 consists of the Big South Fork of the Cumberland River mainstem from its confluence with Laurel Crossing Branch (downstream of Big Shoals) in McCreary County, Kentucky, upstream to its confluence with the New River and Clear Fork, Scott County, Tennessee; North Fork White Oak Creek from its confluence with the Big South Fork upstream to Panther Branch, Fentress County, Tennessee; the New River from its confluence with Clear Fork upstream to U.S. Highway 27, Scott County, Tennessee; Clear Fork from its confluence with the New River upstream to its confluence with North Prong Clear Fork, Morgan and Fentress Counties, Tennessee; White Oak Creek from its confluence with Clear Fork upstream to its confluence with Bone Camp Creek in Morgan County, Tennessee; Bone Camp Creek from its confluence with White Oak Creek upstream to Massengale Branch, Morgan County, Tennessee; Crooked Creek from its confluence with Clear Fork upstream to Buttermilk Branch, Fentress County, Tennessee; and North Prong Clear Fork from its confluence with Clear Fork upstream to Shoal Creek, Fentress County, Tennessee.	Cumberland elktoe, oyster mussel, Cumberlandian combshell	KY, TN	95
Unit 10: Buck Creek	Unit 10 consists of Buck Creek from the State Route 192 Bridge upstream to the State Route 328 Bridge in Pulaski County, Kentucky.	oyster mussel, Cumberlandian combshell	KY	36
Unit 11: Sinking Creek	Unit 11 extends from the Sinking Creek/Rockcastle River confluence upstream to Sinking Creek's confluence with Laurel Branch in Laurel County, Kentucky. This unit is primarily within land owned by the Daniel Boone National Forest, but also includes private lands.	Cumberland elktoe	KY	8
Unit 12: Marsh Creek	Unit 12 consists of Marsh Creek from its confluence with the Cumberland River upstream to State Route 92. This unit is bounded by lands owned by the Daniel Boone National Forest and private landowners.	Cumberland elktoe	KY	15
Unit 13: Laurel Fork	Unit 13 consists of Laurel Fork of the Cumberland River from the Campbell County/Claiborne County line upstream through Claiborne County, Tennessee to rkm 11 (rmi 6.85) in Whitley County, Kentucky. The upstream terminus is two river miles upstream of the Kentucky/Tennessee State Line.	Cumberland elktoe	KY	5

Exhibit 1-1

DESCRIPTION OF CRITICAL HABITAT UNITS AND AREAS ESSENTIAL TO THE CONSERVATION OF THE MUSSELS

	Description	Species	State(s)	River Miles
Areas				
Area 1: French Broad River	Area 1 consists of the French Broad River from below Douglas Dam (rmi 32.5), in Sevier County, TN, downstream to its confluence with the Holston River (rmi 0) in Knox County, TN.	oyster mussel, Cumberlandian combshell[a]	TN	33
Area 2: Holston River	Area 2 consists of the free-flowing reach of the Holston River from below Cherokee Dam to (rmi 52), on the Grainger/Jefferson County line, TN, downstream to its confluence with the French Broad River in Knox County, TN.	oyster mussel, Cumberlandian combshell[a]	TN	52
Area 3: Rockcastle River	Area 3 consists of the free-flowing reach of the Rockcastle River from the backwaters of Cumberland Lake on the Laurel/Pulaski County line, KY, upstream to Kentucky Route 1956 in Rockcastle County, KY.	oyster mussel, Cumberlandian combshell[a]	KY	15

[a] *Note that these Areas are currently unoccupied.*

1.3 Framework and Methodology

39. The primary purpose of this analysis is to estimate the economic impact that will result from the designation of critical habitat for the mussels.[12] This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[13] In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), and the Unfunded Mandates Reform Act (UMRA).[14]

40. This chapter provides the framework for this analysis. First, it defines the economic effects considered in the analysis. Second, it establishes the baseline against which these effects are measured. Third, it describes the measurement of direct compliance costs, which include costs associated with, and generated as a result of, section 7 consultations. Fourth, it identifies potential indirect economic effects of the rule resulting from (1) compliance with other parts of the Act potentially triggered by critical habitat, (2) compliance with other laws, and (3) time delays and regulatory uncertainty. Fifth, it discusses the need for an economic assessment of the benefits of critical habitat designation. Finally, the section concludes by discussing the time frame for the analysis and the general steps followed in the analysis.

1.3.1 Types of Economic Effects Considered

41. This economic analysis considers both the economic efficiency and distributional effects that may result from the designation. In the case of critical habitat designation, economic efficiency effects generally reflect the "opportunity costs" associated with the commitment of resources required to comply with the Act. For example, if the activities that can take place on a parcel of private land are limited as a result of a designation, and thus the market value of the land reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of the designation.

42. This analysis also addresses how the impacts of the designation are distributed, including an assessment of any local or regional economic impacts of the designation and the

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[12] This analysis considers the effects of the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33243).

[13] 16 U.S.C. § 1533(b)(2).

[14] Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5 U.S.C. §§ 601 *et seq*; and Pub Law No. 104-121; and 2 U.S.C. §§658-658g and 1501-1571.

potential effects of the designation on small entities, the energy industry, or governments. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector.

43. For example, while the designation may have a relatively small impact when measured in terms of changes in economic efficiency, individuals employed in a particular sector of the economy in the geographic area of the designation may experience relatively greater effects. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

Efficiency Effects

44. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action.[15] In the context of this regulatory action, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of critical habitat designation. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.[16]

45. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a landowner or manager may need to enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation represents an economic opportunity cost, because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

46. Where a designation is expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that

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[15] Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003; and U.S. Office of Management and Budget, "Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements," in *Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

[16] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/ webpages/Guidelines.html.

precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency can be measured by considering changes in producer and consumer surplus in the real estate market.

47. This analysis begins by measuring reasonably foreseeable compliance costs resulting from the designation. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the designation is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

Distributional and Regional Economic Effects

48. Measurements of changes in economic efficiency focus on the net impact of the regulation, without consideration for how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations concerning groups that may be disproportionately affected. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.[17] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply distribution and use; impacts on governments; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities, Energy Supply, Distribution and Use, and Governments

49. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by critical habitat designation.[18] In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the impacts of critical habitat on the energy industry and its customers.[19] Finally, in accordance with UMRA, this analysis considers the effects of the regulatory action on State, local, and tribal governments and the private sector.[20]

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[17] Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice" 68 *Federal Register* 5492, February 3, 2003.

[18] 5 U.S.C. § 601 *et seq.*

[19] Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001.

[20] 2 U.S.C. §§658-658g and 1501-1571.

Regional Economic Effects

50. Regional economic impact analysis provides an assessment of the potential localized effects of critical habitat designation. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., hydroelectric power generation) and the effect of that change on economic output, income, or employment in other local industries (e.g., manufacturers relying on the electricity generated). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

51. The use of regional input/output models in an analysis of the impacts of critical habitat can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the designation, compensating for a potential decrease in economic activity within the region.

52. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. These types of distributional effects, therefore, should be reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects.

1.3.2 Defining the Baseline

53. OMB guidelines for conducting economic analysis of environmental regulation direct Federal agencies to measure the costs of a regulatory action against a baseline.[21] In its guidance, OMB states, the "baseline should be the best assessment of the way the world would look absent the proposed action" (i.e., absent the designation of critical habitat). In other words, the baseline includes the currently existing regulatory and socio-economic burden imposed on landowners and managers potentially affected by the designation of

[21] U.S. Office of Management and "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003; and U.S. Office of Management and Budget, "Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements," in *Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

critical habitat. The baseline burden may include, for example:

- Local zoning laws;
- State natural resource laws;
- Enforceable management plans and best management practices applied by other State and Federal agencies;
- Federal, State, and local protections already in place in the same geographic area for other (Federal and State) listed species;[22] and/or
- Statutory protections provided for the species by the Act that exist in the absence of designated critical habitat.

Existing baseline laws, regulations, and policies are described in greater detail Section 2 and Appendix B of this analysis.

54. This analysis describes impacts that are expected to occur above and beyond the baseline. In other words, it measures the costs of compliance with the Act that would not occur in the absence of the currently proposed critical habitat. While costs associated with section 9 and 10 of the Act are considered related to the designation of critical habitat they were not considered as there were no available data.

1.3.3 Direct Compliance Costs Associated With Section 7 of the Act

55. The measurement of direct compliance costs focuses on the implementation of section 7 of the Act. This section requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent the direct compliance costs of designating critical habitat.

56. This analysis does not differentiate between consultations that result from the listing of the species (i.e., the jeopardy standard) and consultations that result from the presence of critical habitat (i.e., the adverse modification standard). Consultations resulting from the listing of the species, or project modifications meant specifically to protect to the species as opposed to its habitat, may occur even in the absence of critical habitat. However, in 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all

[22] Certain regulations that provide baseline protection for the species and its habitat may also be the source of indirect costs resulting from new information provided by the designation.

of the economic impacts of critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes.[23] Given the similarity in regulatory definitions between the terms "jeopardy" and "adverse modification," in practice it can be difficult to pre-determine the standard that drives a section 7 consultation. Consequently, in an effort to ensure that this economic analysis complies with the instructions of the 10th Circuit as well as to ensure that no costs of the proposed designation are omitted, the potential effects associated with all section 7 impacts in or near proposed critical habitat are fully considered. In doing so, the analysis ensures that any critical habitat impacts that are co-extensive with the listing of the species are not overlooked. As a result, this analysis likely overstates the regulatory effects under section 7 attributable to the proposed designation of critical habitat.

1.3.4 Indirect Costs

57. The designation may, under certain circumstances, affect actions that do not have a Federal nexus or otherwise are not subject to the provisions of section 7 under the Act. The potential exists for several types of such indirect effects: three examples are discussed in this section. First, some landowners may voluntarily elect to complete a habitat conservation plan (HCP) in response to having their land designated as critical habitat. Second, some State laws may require landowners and managers to consider the effects of their actions on sensitive species and habitat. Thus, designation of critical habitat could trigger additional regulatory burden due to new information provided by the designation. Third, the consultation process may result in time delays for upcoming or ongoing projects, and the designation may foster regulatory uncertainty for prospective projects. If such additional efforts would not have occurred in the absence of critical habitat (i.e., "but for" critical habitat), then they are considered by this analysis to be an impact of the designation. The three most common categories of indirect effects are discussed further below.

Creation of Habitat Conservation Plans (HCPs)

58. Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop an HCP for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[24] The HCP intends to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act. HCPs are not necessarily precipitated by a critical habitat designation.

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[23] *New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001).

[24] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning." From: http://endangered.fws.gov/hcp/, as viewed on August 6, 2002. Sections 9 and 10 of the Act do not apply to plants.

59. However, a connection may exist between the creation of HCPs and the costs these plans impose and the designation of critical habitat. The Service, being a Federal entity, must formally consider whether an HCP will jeopardize a listed species or adversely modify its designated critical habitat before approving the plan. This review process may be a direct impact under section 7 of the Act. However, in certain circumstances, the effort involved in creating the HCP and associated conservation actions may also generate indirect effects associated with the designation of critical habitat. For example, in one past instance, landowners preemptively developed HCPs in an effort to avoid having their property designated as critical habitat.[25] In this case, the effort involved in creating the HCP and undertaking associated conservation actions were considered to be an effect of designation.

60. The following scenarios regarding HCP creation provide general guidance regarding the degree to which associated costs should be considered within the context of a critical habitat economic analysis:

- In cases in which an HCP existed prior to a proposed designation, the costs of developing the HCP and the added costs of management imposed by the HCP should not be considered in the analysis of the effects of the designation. These costs are appropriately considered to be part of the regulatory baseline, because their creation was driven by the listing of the species and the need to avoid take, which is prohibited under section 9 of the Act. However, in cases where designated critical habitat overlaps with completed HCPs, the economic analysis will need to consider the cost to the Service to re-consult on the plan's impact to critical habitat and whether or not this process may result in additional conservation actions.

- In cases in which an HCP is proposed, or reasonably foreseeable absent the designation of critical habitat, the administrative costs associated with the required internal section 7 consultation should be included in the economic analysis of total section 7 costs, because the Service will need to consider the effects of the plan on designated critical habitat. In addition, if as a result of the designation additional project modifications will be recommended by the Service and incorporated into the HCP in order to avoid adversely modifying critical habitat, the costs of these project modifications should also be included in the economic analysis of critical habitat.[26]

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[25] See Industrial Economics, Incorporated, *Draft Economic Analysis of Critical Habitat Designation for the Nine Bexar County Texas Invertebrate Species*, prepared for the U.S. Fish and Wildlife Service, October 2002.

[26] Project modification costs associated with the jeopardy standard are not considered for the following reason. Section 10(a)(2)(B) of the Act requires that for the issuance of an incidental take permit, the HCP must assure that "the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild." According to the Service's *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, "the wording of this criterion is identical to the "jeopardy" definition under the section 7 regulations (50 CFR Part 402.02)...Congress was explicit about this link, stating in the Conference Report on the 1982 ESA amendments that

- In cases in which development of one or more HCPs can be documented as being precipitated by critical habitat designation (i.e., to avoid designation or to reduce the costs of the designation), the costs of development of the HCP and the added costs of management imposed by the HCP should be included in the critical habitat economic analysis. In such cases the analysis should be presented with appropriate caveats as to the uncertainty regarding the extent to which the HCP would have existed absent critical habitat designation.

Other State and Local Laws

61. Under certain circumstances, the designation of critical habitat may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered "but for" the designation of critical habitat, they are included in this economic analysis.

62. For example, in California the California Environmental Quality Act (CEQA) requires that lead agencies -- public agencies responsible for project approval -- consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. Among other effects, the CEQA statutes specifically require lead agencies to consider a project's effects on rare or endangered plant and animal communities."[27] In some instances, the designation of critical habitat can have an indirect effect on CEQA- related requirements. For example, applicants who were "categorically exempt" from preparing an Environmental Impact Report under CEQA may no longer be exempt once critical habitat is designated.

63. In these and other cases in which costs are incurred by landowners and managers above and beyond what would be required under State or local law and policy in the absence of the designation, these costs are considered to be an indirect effect of the designation. As such, these economic effects are reported in the analysis.

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the Services will determine whether or not to grant a permit, "in part, by using the same standard as found in section 7(a)(2) of the ESA, as defined by the [Services'] regulations.'" (U.S. Department of the Interior and U.S. Department of Commerce, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, November 4, 1996). As a result, during the HCP process, actions undertaken to meet the jeopardy provision of section 7 are also required under section 10 of the Act and are therefore considered to be part of the baseline of this economic analysis.

[27] Article 19 of CEQA provides a list of categorical exemptions, which are descriptions of types of projects that usually do not have a significant effect on the environment (e.g., replacement or reconstruction of existing facilities, actions taken by regulatory agencies as authorized by State law or local ordinance to assure the maintenance, restoration, or enhancement of a natural resource.) (http://ceres.ca.gov/ceqa/flowchart/exemptions/categorical.html, as viewed on April 21, 2003.)

Time Delays and Regulatory Uncertainty

64. In addition to the indirect effects of compliance with other laws triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts. These can include costs due to project delays associated with the consultation process or compliance with other regulations, or, in the case of land location within or adjacent to the designation, loss in property values due to regulatory uncertainty, and loss (or gain) in property values resulting from public perceptions regarding the effects of critical habitat. These categories of potential effects are described in greater detail below.

Time Delays

65. Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the section 7 consultation process and/or compliance with other laws triggered by the designation. The need to conduct a section 7 consultation will not necessarily delay a project, as often the consultation may be coordinated with the existing baseline regulatory approval process. However, depending on the schedule of the consultation, a project may experience additional delays, resulting in an unanticipated extension in the time needed to fully realize returns from the planned activity. To the extent that delays result from the designation, they are considered in the analysis. Specifically, the analysis considers costs associated with any incremental time delays associated with section 7 consultation or other requirements triggered by the designation above and beyond project delays resulting from baseline regulatory processes.

Regulatory Uncertainty

66. The Service conducts each section 7 consultation on a case-by-case basis and issues a Biological Opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who need to consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. However, a degree of regulatory uncertainty may persist. In some cases, this uncertainty may be incorporated by the project proponent into the costs of completing a proposed activity. For example, mining companies uncertain about potential restrictions to their activities in designated areas of critical habitat may lease mining rights at a reduced rate. Additionally, landowners may incur costs determining whether their property constitutes critical habitat.[28] They may retain outside experts or legal counsel to better understand their responsibilities with regard to critical habitat. Where appropriate, the analysis considers the potential costs

[28] Designated critical habitat may also reduce such costs in the sense that boundaries are legally defined in the rule, which in some cases, clarifies the importance of specific land parcels.

associated with regulatory uncertainty.

Stigma

67. In some cases, the public may perceive that critical habitat designation may result in incremental changes to private property values, above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. That is, the public may perceive that, all else being equal, a property that is designated as critical habitat will have lower market value than an identical property that is not within the boundaries of critical habitat. Public attitudes about the limits and costs that critical habitat may impose can cause real economic effects to the owners of property, regardless of whether such limits are actually imposed.

68. Conversely, the direction of property value effects resulting from critical habitat may be positive rather than negative. For example, property owners may believe that critical habitat designation will increase property values, if they believe that such designation will slow sprawling development in a given community (i.e., protect the rural character of an area) or increase water quality of neighborhood streams and rivers. This perception alone may result in real increases in land values, even in cases where the economic analysis predicts no additional requirements on activities taking place in the area. In either case, as the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets should decrease. This analysis considers the implications of public perceptions related to critical habitat on private property values within the proposed designation.

1.3.5 Benefits

69. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species. Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

70. In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of a proposed regulatory actions.[29] However, in its guidance for implementing Executive Order 12866, OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.[30] Where benefits

[29] Executive Order 12866, "Regulatory Planning and Review," September 30, 1993.

[30] U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003; and U.S. Office of Management and Budget, "Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting

cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively. This report provides insight into the potential economic benefits of critical habitat designation based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of all of the benefits that could result from the designation. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

1.3.6 Analytic Time Frame

71. The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a ten year time frame, beginning on the day that the current proposed rule becomes available to the public. The ten-year time frame was chosen for the analysis because, as the time horizon for an economic analysis is expanded, the assumptions on which the projected numbers of projects are based become increasingly speculative. As a result, it is difficult to predict not only the numbers of projects, but also the cost estimates for the associated consultations, beyond a ten-year window. Consequently, any attempt to extend the economic analysis beyond the ten-year time window would be speculative.

1.3.7 General Analytic Steps

72. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of the proposed designation. The steps followed in this analysis consist of:

- Describing current and projected economic activity within and around the proposed critical habitat area;
- Identifying whether such activities are likely to involve a Federal nexus;
- For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
- Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts associated with the designation;

Statements," in *Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

- Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the proposed designation;

- Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;

- Estimating the likelihood that economic activity will be affected by regulatory uncertainty, and/or property values affected;

- Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, and effects on property values;

- Assessing the extent to which critical habitat designation will create costs for small businesses as a result of modifications or delays to projects;

- Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and

- Determining the benefits that may be associated with the designation of critical habitat.

73. As noted above, this analysis considers both the efficiency effects and distributional effects that could result from this designation. It begins by considering direct compliance costs associated with the designation, as well as potential indirect effects, such as those effects associated with compliance with other Federal, State, and local laws, project delays, and impacts to property values. As necessary, regional economic impacts are described, as are impacts on significantly affected markets. Impacts on small entities and energy production and consumption are discussed separately, in Appendix C. Potential benefits of critical habitat are discussed qualitatively, in Section 5.

1.4 Information Sources

74. The primary sources of information for this report were communications with personnel from the Service, affected Federal agencies, State agencies and counties. Specifically, communication with personnel from the following entities:

- Alabama Department of Environmental Management (ADEM)
- Alabama Department of Transportation (ADOT)
- Army Corps of Engineers (USACE), Nashville and Norfolk Districts
- Bureau of Economic Analysis (BEA)
- U.S. Census Bureau
- U.S. Environmental Protection Agency (EPA), Regions 3 and 4
- Federal Energy Regulatory Commission (FERC)
- Federal Highway Administration (FHWA), Tennessee, Kentucky, Mississippi, Alabama, and Virginia Divisions
- U.S. Forest Service (FS), Daniel Boone National Forest
- Kentucky Department of Environmental Protection (KDEP)
- Kentucky Department for Surface Mining Reclamation and Enforcement (DSMRE)
- Kentucky Division of Forestry
- Kentucky Division of Oil and Gas (DOG)
- Kentucky Natural Resources and Environmental Protection Cabinet, Division of Water, Water Quality Branch
- Kentucky Transportation Cabinet (KTC)
- Mississippi Department of Environmental Quality (MDEQ)
- Mississippi Department of Transportation (MDOT)
- National Park Service (NPS), Big South Fork National River and Recreation Area, Obed Wild and Scenic River
- Natural Resources Conservation Service (NRCS), Tennessee, Kentucky, Virginia, Alabama, Mississippi Districts
- Department of Interior (DOI), Office of Surface Mining (OSM)
- Rural Utilities Service (RUS)
- Small Business Administration (SBA)
- Tennessee Department of Environment and Conservation (TDEC), Division of Geology (TOG), Division of Natural Heritage (DNH)
- Tennessee Department of Transportation (TDOT)
- Tennessee Division of Geology (TDG)
- Tennessee Duck River Development Agency (TDRDA)
- Tennessee Forestry Division
- Tennessee Valley Authority (TVA)
- Virginia Department of Environmental Quality (VDEQ)
- Virginia Department of Mines, Minerals, and Energy (DMME), Department of Mine Land Reclamation (DMLR)
- Virginia Department of Transportation (VDOT)

- Private Consulting Firms
- Affected counties

75. This section provides information on the socioeconomic characteristics of areas proposed as critical habitat for the mussels. In addition, this section provides relevant information about regulations and requirements that exist in the baseline (i.e., the "without section 7" scenario).

2.1 Socioeconomic Profile of the Critical Habitat Area

76. This section summarizes key economic and demographic information for the 26 counties with areas either proposed for critical habitat or considered important for the conservation of the mussels in Mississippi, Alabama, Virginia, Kentucky, and Tennessee. County-level data are presented to provide context for the discussion of potential economic impacts and to illuminate trends that may influence these impacts.[31] Although county level data may not precisely reflect the socioeconomic characteristics of the areas immediately surrounding the proposed critical habitat and areas essential for the conservation of the mussels, as the units/areas comprise rivers and creeks that cross small portions of counties or cross county barriers, these data provide useful context for the broader analysis.

2.1.1 Mississippi

77. Critical habitat has been proposed for a portion of Tishomingo County in northeast Mississippi. This county has a total population of 19,163, or less than one percent of the total Mississippi population of 2,844,658 in 2000. The population of the county has increased by about eight percent since the 1990 census.

78. In 2000, Tishomingo County had a per capita personal income (PCPI) of $16,949. This PCPI was 19 percent below the State average of $20,920, and 44 percent below the national average of $30,413.

[31] Population summaries are derived primarily from: U.S. Census Bureau, State and County QuickFacts. accessed at http://quickfacts.census.gov/qfd/index.html and county estimates. Personal income data are derived from U.S. Bureau of Economic Analysis, Regional Accounts Data, accessed at http://www.bea.gov/bea/regional/reis/.

2.1.2 Alabama

79. Critical habitat has been proposed for a portion of Colbert County in northwest Alabama. In 2000, Colbert had a total population of 54,984, or slightly over Alabama's total population of 4,447,100. The population of the county increased by six percent from 1990 to 2000.

80. In 2000, Colbert County had a PCPI of $22,146, which was five percent less than the State average of $23,964 and 27 percent below the national average of $30,413.[32]

2.1.3 Virginia

81. Critical habitat has been proposed for portions of Lee, Scott, Russell, and Tazewell Counties in western Virginia. These counties have a total population of 121,898, or about two percent of Virginia's total population of 7,078,515 in 2000. On average, the total population of the counties decreased by less than one percent from 1990 to 2000.

82. The four counties containing proposed critical habitat area in Virginia had a median[33] PCPI of $17,937 in 2000, which was 43 percent below the average PCPI of the entire State of Virginia ($31,210) and 41 percent below the national average of $30,413.

2.1.4 Kentucky

83. Critical habitat has been proposed within portions of Laurel, McCreary, Pulaski, and Whitley Counties in southeastern Kentucky. In addition, areas within Rockcastle County are considered essential to the conservation of the mussels. These counties collectively had a total population of 178,459 in 2000, or over four percent of the total Kentucky population (4,041,769). With 56,217 residents, Pulaski County has the highest population of any county containing proposed critical habitat units or areas considered essential for the conservation of the mussels in Kentucky. Rockcastle County is the least populous county with 16,582 residents. From 1990 to 2000, the median population increase of the counties was 12 percent.

84. The five counties in Kentucky had a median PCPI of $17,198 in 2000, which is 71 percent of the average PCPI of the entire State of Kentucky ($24,258) and 43 percent below the national average of $30,143. Pulaski has the highest per capita income of the four counties ($21,081), while McCreary has the smallest ($13,768).

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[33] The median value represents the middle value such that roughly half of the data is smaller and roughly half of the data is larger.

2.1.5 Tennessee

85. Critical habitat has been proposed for portions of Maury, Marshall, Fentress, Scott, Morgan, Cumberland, Hancock, Claiborne, Hawkins, Cocke, and Hamblen Counties in Tennessee. In addition, areas within Grainger, Jefferson, Knox, and Sevier Counties are considered essential to the conservation of the mussels. These 15 counties collectively have a population of 900,635, or approximately 16 percent of Tennessee's population of 5,689,283. With 382,032 residents, Knox County has the highest population of any county containing proposed critical habitat units or areas considered essential to the conservation of the mussels within Tennessee. Hancock County is the least populous Tennessee county with just under 7,000 residents. The median population increase of these 15 counties since the 1990 census is 15 percent, less than that of the State, which experienced an increase of approximately 17 percent.

86. The median 2000 PCPI of the 15 counties within Tennessee was $19,355, which is 74 percent of Tennessee's average PCPI ($26,290) and 36 percent below the national average of $30,413. Knox had the highest PCPI of the 15 counties ($28,440), while Hancock had the smallest ($13,619).

2.1.6 Summary

87. Exhibit 2-1 below summarizes key socioeconomic information for the 26 counties containing proposed critical habitat or areas considered essential for the conservation of the mussels. From 1990 to 2000, Alabama, including Colbert County, and Mississippi, including Tishomingo County, grew at a slower rate than the nation (which grew at 13.1 percent). While Kentucky also grew at a slower rate than the nation, both Laurel and Pulaski Counties exceeded the national average growth rate for the decade. The population growth in Virginia also exceeded the national average, but not in the counties containing proposed critical habitat; Russell and Scott Counties grew at a slower rate, and Lee and Tazewell Counties experienced a population decline during the decade. Tennessee, which contains the remaining 15 counties, grew at a faster rate than the nation. With the exception of Hancock County, all counties containing proposed critical habitat within Tennessee also grew at faster rates than the nation.

Exhibit 2-1
SOCIOECONOMIC PROFILE OF COUNTIES CONTAINING CRITICAL HABITAT UNITS AND AREAS ESSENTIAL TO THE CONSERVATION OF THE MUSSELS (2000)

State	County	Population	Percent of State	Percent Change 1990 to 2000	Per Capita Income	Persons per square mile	Unit/Area	Description
Alabama	**State Total**	**4,447,100**	**100%**	**10.1%**	**23,694**	**87.6**		
	Colbert	54,984	1.2%	6.4%	22,146	92.5	U2	Bear Creek
Kentucky	**State Total**	**4,041,769**	**100%**	**9.6%**	**24,258**	**101.7**		
	Laurel	52,715	1.3%	21.4%	20,063	121.0	U11, A3	Sinking Creek, Rockcastle River
	McCreary	17,080	0.4%	9.5%	13,768	39.9	U8, U9, U12	Rock Creek, Big South Fork, Marsh Creek
	Pulaski	56,217	1.4%	13.6%	21,081	85.0	U10, A3	Buck Creek, Rockcastle River
	Rockcastle	16,582	0.4%	12.0%	15,986	52.2	A3	Rockcastle River
	Whitley	35,865	0.9%	7.6%	17,198	81.5	U13	Laurel Fork
Mississippi	**State Total**	**2,844,658**	**100%**	**10.5%**	**20,900**	**60.6**		
	Tishomingo	19,163	0.7%	8.4%	16,949	45.2	U2	Bear Creek
Tennessee	**State Total**	**5,689,283**	**100%**	**16.7%**	**26,290**	**138.0**		
	Claiborne	29,862	0.5%	14.3%	19,171	68.8	U4, U13	Powell River, Laurel Fork
	Cocke	33,565	0.6%	15.2%	18,255	77.3	U6	Nolichucky River
	Cumberland	46,802	0.8%	34.7%	21,317	68.7	U3	Obed River
	Fentress	16,625	0.3%	13.3%	18,990	33.3	U9	Big South Fork
	Grainger	20,659	0.4%	20.8%	17,494	73.7	A2	Holston River
	Hamblen	58,128	1.0%	15.2%	24,060	361.0	U6	Nolichucky River
	Hancock	6,786	0.1%	7.0%	13,626	30.5	U4, U5	Powell River, Clinch River
	Hawkins	53,563	0.9%	20.2%	19,255	110.1	U7	Beech Creek
	Jefferson	44,294	0.8%	34.2%	20,331	161.8	A2	Holston River
	Knox	382,032	6.7%	13.8%	28,440	751.3	A1	French Broad River
	Marshall	26,767	0.5%	24.3%	24,218	71.3	U1	Duck River
	Maury	69,498	1.2%	26.8%	23,489	113.4	U1	Duck River
	Morgan	19,757	0.3%	14.2%	15,412	37.8	U3, U9	Obed River, Big South Fork
	Scott	21,127	0.4%	15.1%	17,207	39.7	U9	Big South Fork
	Sevier	71,170	1.3%	39.4%	19,869	120.2	A1	French Broad River

Exhibit 2-1
SOCIOECONOMIC PROFILE OF COUNTIES CONTAINING CRITICAL HABITAT UNITS AND AREAS ESSENTIAL TO THE CONSERVATION OF THE MUSSELS (2000)

State	County	Population	Percent of State	Percent Change 1990 to 2000	Per Capita Income	Persons per square mile	Unit/Area	Description
Virginia	**State Total**	**7,078,515**	**100%**	**14.4%**	**31,210**	**178.8**		
	Lee	23,589	0.3%	-3.7%	17,308	54.0	U4	Powell River
	Russell	30,308	0.4%	5.7%	18,565	63.9	U5	Clinch River
	Scott	23,403	0.3%	0.9%	17,049	43.6	U5	Clinch River
	Tazewell	44,598	0.6%	-3.0%	20,052	85.8	U5	Clinch River

Source: Population summaries are derived primarily from: U.S. Census Bureau, accessed at http://quickfacts.census.gov/qfd/index.html and http://www.census.gov/epcd/cbp/view/cbpview.html and Bureau of Economic Analysis Regional Accounts Data, accessed at http://www.bea.gov/bea/regional/reis/

2.1.7 Economic Activity

88. Some of the most common land use activities occurring within the vicinity of the critical habitat units and areas essential to the conservation of the mussels are agriculture, recreation, and development-related activity. However, these activities do not necessarily constitute the bulk of economic activity occurring within the proposed critical habitat units. The largest industries, as defined by annual payroll by industry, are manufacturing, health care and social assistance, and retail trade. Understanding the extent of the various land-use activities and economic sectors in areas in or around critical habitat units and areas essential to the conservation of the mussels underscores the activities most likely to experience section 7 impacts. Exhibit 2-2 highlights the annual payroll for various industries in the 26 counties containing critical habitat units and areas essential to the conservation of the mussels.

2.2 Relevant Baseline Elements

89. "Baseline elements" consist of regulations, guidelines, and/or policies that may afford protection for the mussels in the absence of section 7 implementation. Baseline protections for the mussels include Federal and State laws, including the prohibition against take of the species contained within section 9 of the Act, as well as voluntary environmental programs that provide protection to the mussels in the absence of the protection afforded by the listing and any anticipated additional protection afforded by the proposed critical habitat designation. This discussion focuses on several important regulatory elements that have bearing on this analysis.

90. The following regulations provide environmental protection in the proposed critical habitat areas. Most of these regulations specifically address the maintenance or improvement of water quality. Because the mussels are aquatic species, they benefit from these protections. Although section 7 consultations will take place on activities involving a Federal nexus, measures required to protect the mussels and their habitat are complemented by regulations that serve to protect water quality. Provided these regulations are properly implemented and effective, the presence of mussels' critical habitat would not be expected to result in extensive project modifications. Appendix B provides additional discussion of State and other baseline regulatory elements potentially relevant to this analysis.

Exhibit 2-2

ECONOMIC ACTIVITY WITHIN COUNTIES CONTAINING CRITICAL HABITAT/AREAS ESSENTIAL TO THE CONSERVATION OF THE MUSSELS: ANNUAL PAYROLL BY INDUSTRY (2000)

Industry	Annual Payroll (Thousands)				
	Virginia	Tennessee	Mississippi	Kentucky	Alabama
Agriculture, Forestry, Hunting, and Fishing	$1,680	$2,175	--	$1,637	--
Mining	$73,881	$34,723	--	$44,673	$3,406
Utilities	--	$5,548	--	$13,187	--
Construction	$38,594	$520,417	$4,775	$108,493	$38,575
Manufacturing	$95,749	$2,444,416	$58,442	$259,740	$147,157
Wholesale Trade	$28,028	$779,879	$4,560	$84,327	$35,931
Retail Trade	$91,375	$1,041,632	$10,766	$166,896	$53,009
Transportation and Warehousing	$14,309	$292,183	$3,943	$55,827	$8,916
Information	$12,589	$292,297	$447	$52,618	$5,089
Finance and Insurance	$22,381	$481,365	$3,725	$66,584	$15,794
Real Estate	$5,150	$155,453	$230	$10,074	$3,208
Professional, scientific & technical services	$34,285	$504,324	$1,774	$35,087	$6,263
Management of companies and enterprises	$3,395	$298,365	--	$6,988	--
Admin, support, waste mgt, remediation services	$10,554	$420,090	$863	$171,086	$27,384
Educational services	$3,908	$40,577	$489	$827	$838
Health care and social assistance	$107,227	$1,467,565	$11,460	$223,382	$53,014
Arts, entertainment & recreation	$4,699	$96,999	--	$4,338	--
Accommodation & food services	$15,917	$448,189	$1,400	$49,551	$14,821
Other services (except public administration)	$16,523	$272,608	$1,556	$27,992	$18,216
Auxiliaries (exc corporate, subsidiary & regional mgt)	--	$32,598	--	--	--
Unclassified establishments	$368	$2,950	--	$88	--
TOTAL	$580,612	$9,634,353	$104,430	$1,383,395	$431,621

Source: U.S. Census Bureau, *2000 County Business Patterns*, accessed at http://censtats.census.gov/cbpnaic/cbpnaic.shtml on May 23, 2003.
Notes: Payroll estimates are in 2001 dollars. These values reflect the combined value of the counties containing critical habitat within these States, and are not statewide totals. "--" represents data not reported in the Census County Business Patterns.

2.2.1 Recovery Plan

91. An important component of the regulatory baseline is the Agency Draft Recovery Plan for Cumberland Elktoe, Oyster Mussel, Cumberlandian Combshell, Purple Bean, and Rough Rabbitsfoot, published in 2003.[34] The Recovery Plan establishes recovery criteria for the mussels and proposes actions to restore viable mussel populations. The ultimate goal of the Recovery Plan is to establish criteria and objectives that when implemented should enable the species to recover to the point that it can be removed from the Federal list of endangered and threatened wildlife and plants. While the Recovery Plan imposes no binding restrictions or obligations on landowners and managers, it serves as an important information source.

2.2.2 Overlap With Other Listed Species

92. Several other Federally listed endangered species may be found within the proposed critical habitat area for the mussels. Further, critical habitat exists for three fish species within the portions of the proposed critical habitat for the mussels.[35] Generally, if a consultation is triggered for any listed species, the consultation process will also take into account all other listed species known or thought to occupy areas on or near the project lands. As such, listing or critical habitat-related protections for other threatened or endangered species may benefit the mussels as well (i.e., provide baseline protection). However, due to the difficulty in apportioning the costs of consultations between various species as well as awareness that a consultation for the mussels would need to be conducted absent consultations for or involving other species, this analysis does not attempt to apportion the consultations and related costs reported by Action agencies between the mussels and other listed species, and assumes that all future section 7 consultations within the extant boundaries of the proposed critical habitat are fully attributable to the presence of the mussels and their habitat. While this may lead to an overestimate of costs, it is likely that adding consideration of mussel critical habitat to a consultation regarding other species or habitats will add an incremental cost to that consultation. The Service has conducted consultations on the mussels in combination with numerous species, as indicated in Appendix A.

2.2.3 Federal Statutes and Regulations

Federal Power Act

93. The Federal Power Act (FPA) was promulgated in 1920.[36] The purpose of the FPA

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[34] U.S. Fish and Wildlife Service. 2003. Agency Draft Recovery Plan for Cumberland Elktoe, Oyster Mussel, Cumberlandian Combshell, Purple Bean, and Rough Rabbitsfoot. Atlanta, Georgia. 176 pp.

[35] Approximately 207 miles of the proposed critical habitat for the mussels is designated critical habitat for the yellowfin madtom, slender chub, or spotfin chub on portions of Unit 3 Obed River, Unit 5 Clinch River, and Unit 4 Powell River.

[36] Federal Power Act, 16 U.S.C. §800 (1986).

was to establish a regulatory agency, the Federal Power Commission (FPC), for non-Federal hydropower generation and to require non-Federal hydropower owners/operators to obtain a license for the operation of the facility. Over the years, the FPC took responsibility for additional national regulatory issues and evolved into the Federal Energy Regulatory Commission (FERC), an independent Federal agency governing approximately 2,500 licenses for non-Federal hydropower facilities.[37] In 1986 the FPA was amended to, among other things, require FERC to give equal consideration to fish and wildlife concerns affected by hydropower facilities during the relicensing process.

94. Specifically, section 10(j) of the FPA was promulgated to ensure that FERC considers both power and non-power resources during the licensing process. As such, section 10(j) instructs FERC to actively solicit input regarding "adequate and equitable" fish and wildlife measures from Federal and State resource agencies.[38] FERC must consider these recommendations during the licensing process but does not have to incorporate the recommendations into the license if they "may be inconsistent with the purposes and requirements of the FPA" or if the recommendations are not supported by substantial evidence.

95. Furthermore, section 18 of the FPA provides that FERC require facility owners/operators to construct, maintain, and operate, at their own expense, fishways[39] if operation of the facility will impact the passage of fish species in the project area or planned for introduction in the area.[40]

Clean Water Act (CWA)

96. The purpose of the CWA is to restore the physical, biological, and chemical integrity of the waters of the United States using two basic mechanisms: 1) direct regulation of discharges pursuant to permits issued under the National Pollution Discharge Elimination System (NPDES) and section 404 (discharge of dredge or fill materials); and 2) the Title III water quality program.[41]

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[37] Federal Power Act Summary, American Rivers Organization, http://www.amrivers.org/hydropowertoolkit/hydroreformtoolkitlawsfpa.htm

[38] Federal Power Act, 16 U.S.C. §803(j) (1986).

[39] A fishway is a structure constructed at a dam that allows for fish species to pass over the dam without harm or injury. A variety of ways exist to establish a fishway, ranging from a step and pull system (fish swim along a slope with notches that act like stairs) to an elevator (fish swim into a large box that is lifted over the dam where the fish are released). According to Section 1701(b) of the Energy Policy Act of 1992, "[T]he item which may constitute a 'fishway' under section 18 for the safe and timely upstream and downstream passage of fish shall be limited to physical structures, facilities, or devices necessary to maintain all life stages of such fish, and project operations and measures related to such structures, facilities, or devices which are necessary to ensure the effectiveness of such structures, facilities, or devices for such fish".

[40] Federal Power Act, 16 U.S.C. §811 (1986).

[41] Clean Water Act, 33 U.S.C. §1251 (1987).

97. Under the NPDES program, EPA sets pollutant-specific limits on the point source discharges for major industries and provides permits to individual point sources that apply to these limits. EPA has delegated responsibility for the NPDES permitting program to most States.[42] State-issued NPDES permits are treated as non-Federal actions. As such, the issuance of NPDES permits by States are not subject to the consultation requirements of the Act. The Service consults with the EPA on the triennial review to ensure that threatened and endangered species impacts are contemplated in the development of standards.

98. Under the water quality standards program (WQS), EPA has issued water quality criteria to establish limits on the ambient concentration of pollutants in surface waters that will still protect the health of the water body. States issue water quality standards that reflect the Federal water quality criteria and submit the standards to EPA for review. State water quality standards are subject to review every three years (triennial review). States apply the standards to NPDES discharge permits to ensure that discharges do not violate the water quality standards.[43]

99. Under section 401 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters are required to submit a State certification to the licensing or permitting agency. The State certification must state that the discharge complies with the requirements of sections 301, 302, 303, 306, and 307 of the CWA. Section 404 of the CWA prescribes a permit program for the discharge of dredged or fill material into navigable waters. Specifically, pursuant to section 404, permit applicants are required to show that they have "taken steps to avoid wetland impacts, where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or recreate wetlands."[44]

100. The CWA will influence activities on or near all 13 of the critical habitat units, due to the existence of road/bridge construction, residential development, and hydropower relicensing activities on or near all 13 units. Since water quality is important to the recovery of the mussel, this statute will likely impact the extent, location, and nature of future activities on or near the proposed critical habitat units over the next ten years. As such, the CWA is likely to provide substantial baseline protection to the mussels.

Tennessee Valley Authority (TVA) Act

101. Section 26a of the TVA Act requires TVA approval of any construction activities that affect navigation, flood control, or public lands along the shoreline of the TVA reservoirs, the Tennessee River, or its tributaries. Before permitting an activity it must be deemed compatible with its mission of integrated river management, including water quality, flood control, navigation, land use, recreation, and power generation. Activities that require approval include boat docks, piers, boat ramps, bridges, culverts, commercial marinas, barge

[42] Clean Water Act, 33 U.S.C. §402.

[43] Clean Water Act, 33 U.S.C. §303, 305.

[44] Section 404 of the Clean Water Act: An Overview, http://www.epa.gov/owow/wetlands/facts/fact10.html

terminals and mooring cells, water intake and sewage outfalls, and fill or construction within the floodplain. The TVA Act will influence activities on or near nine critical habitat units for the mussels.[45]

National Wild and Scenic Rivers Act (NWSRA)

102. The NWSRA requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas." It also requires that "the Secretary of the Interior shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas.....shall be evaluated in planning reports by all Federal agencies as potential alternative uses of water and related land resources involved."[46] In partial fulfillment of this requirement, NPS maintains a Nationwide Rivers Inventory (NRI), a register of river segments that potentially qualify as national wild, scenic or recreational river areas.[47] A presidential directive requires Federal agencies to avoid or mitigate adverse effects on rivers identified in the NRI. In addition, agencies are required to consult with the NPS on actions which could affect the wild, scenic or recreational status of a river on the inventory.

103. The NWSRA will provide baseline protection to seven of the 13 critical habitat units for the mussels (Unit 3 Obed River, Unit 10 Buck Creek, Unit 5 Clinch River, Unit 12 Marsh Creek, Unit 4 Powell River, Unit 8 Rock Creek, and Unit 11 Sinking Creek). Since Federal agencies are required to avoid or mitigate adverse effects on National Wild and Scenic Rivers and those on the NRI, this statute will likely impact the extent, location, and nature of future activities on or near the seven proposed critical habitat units over the next ten years. As such, the NWSRA is likely to provide substantial baseline protection to the mussels.

Fish and Wildlife Coordination Act

104. The purpose of this act is to ensure that fish and wildlife resources are equally considered with other resources during the planning of water resources development projects by: 1) authorizing the Secretaries of Agriculture and Commerce to provide assistance to Federal and State agencies in protecting game species and studying the effects of pollution on wildlife; and 2) requiring consultation with the Service for water impoundment or diversion projects with a Federal nexus.[48]

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[45] These include the Unit 1 Duck River, Unit 2 Bear Creek, Unit 3 Obed River, Unit 4 Powell River, Unit 5 Clinch River, Unit 6 Nolichucky River, Unit 7 Beech Creek, Unit 9 Big South Fork, and Unit 13 Laurel Fork.

[46] National Wild and Scenic Rivers Act, 16 U.S.C. §1271-1287 (1968).

[47] The NRI qualifies as a comprehensive plan under section 10(a)(2)(A) of the Federal Power Act.

[48] Fish and Wildlife Coordination Act, 16 U.S.C. 661-666.

Soil and Water Resources Conservation Act of 1977

105. This Soil and Water Resources Conservation Act provides for a continuing appraisal of the Nation's soil, water and related resources, including fish and wildlife habitats, and a soil and water conservation program to assist landowners and land users in furthering soil and water conservation. Specifically, this Act authorizes the Secretary of Agriculture to establish a cooperative conservation program with Federal, State, and local stakeholders for the management of private grazing land to conserve and enhance private grazing land resources.[49]

Watershed Protection and Flood Prevention Act

106. This Act authorizes Federal assistance to local organizations for conservation projects in watershed areas. Specifically, the Secretary of Agriculture is authorized to enter into agreements with local organizations and landowners to provide financial and other assistance in the development of plans to conserve and develop the land's soil, water, woodland, wildlife, energy and recreation resources, and enhance water quality.[50]

Endangered Species Act Landowner Incentives Program

107. This voluntary program, managed by the Service, provides technical and financial assistance to private landowners to address the needs of threatened and endangered species, while also incorporating the need for economic development. Private landowners are offered financial incentives to engage voluntarily in mitigation and habitat conservation planning. These incentives may be in the form of tax incentives and/or cost share payments funded through the Wildlife Conservation Fund or the Land and Water Conservation Fund. To qualify for this program, landowners or other non-Federal partners must contribute at least ten percent of the cost of the conservation project.[51]

Surface Mining Control and Reclamation Control Act (SMCRA)

108. One of the purposes of the SMCRA is to assure surface coal mining operations are conducted to protect the environment.[52] Title 5 of the SMCRA provides requirements for the control of environmental impacts. Operations are required to effectively control erosion and water pollution, to insure that all debris, acid-forming materials, toxic materials, or materials constituting a fire hazard will not contaminate ground or surface waters, control and/or prevent erosion and siltation, pollution of water, damage to fish or wildlife or their habitat, or flow alteration in association, with access roads, and revegetate the area when the

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[49] Soil and Resources Conservation Act, 16 U.S.C. 2001-2009.

[50] Watershed Protection and Flood Prevention Act, 16 U.S.C. §§ 1001-1009.

[51] U.S. Fish and Wildlife Service, *Fiscal Year 2003 Budget Justifications*, Appropriation: Land Owner Incentive Program, pp. 401.

[52] Surface Mining Control and Reclamation Act, 30 U.S.C. §1202 (1977).

operation is complete.

109. States are allowed to assume exclusive jurisdiction over the regulation of surface coal mining and reclamation operations on non-Federal lands, contingent upon the State regulation being as effective and no less stringent than the Federal. The States of Mississippi, Alabama, Kentucky, and Virginia have regulatory primacy for surface coal mining. Tennessee does not have regulatory authority ("primacy "); instead, OSM is responsible for regulating surface coal mining.

The National Flood Insurance Act and The Flood Disaster Protection Act

110. Conditions of future Federal financial assistance to States and/or local communities are 1) the requirement to participate in the flood insurance program; and 2) the adoption of flood plain ordinances with enforcement provisions, consistent with Federal standards, to reduce or avoid future flood losses.[53] Property owners who are being assisted by Federal programs or by federally supervised, regulated, or insured agencies or institutions in the acquisition or improvement of land or facilities currently located or to be located in areas identified as special flood hazards are required to purchase flood insurance. The 100-year flood is used by the National Flood Insurance Program as the standard for floodplain management and the determination of the need for flood insurance.[54]

2.2.4 State Statutes and Regulations and Other Voluntary Protection Measures

111. Additional State and other baseline regulatory elements potentially relevant to this analysis are described in Appendix B. As the Appendix shows, a considerable number of State and other regulatory initiatives could provide the mussels with some measure of protection absent section 7 consultation.

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[53] The National Flood Insurance Act 42 U.S.C. §4001 *et seq.* (1968). The Flood Disaster Protection Act 42 U.S.C. §4001 *et seq.* (1973)

[54] The 100-year flood is defined as "the elevation that has a one percent chance of being equaled or exceeded each year".

112. The previous two sections introduced the geographic areas in which the Service is proposing to designate critical habitat for the mussels, the socioeconomic profile of these areas, and general trends associated with population, economic, and urban growth. These sections also outlined the baseline level of protection afforded the mussels and their habitat. This section identifies the current land and water uses in or near proposed critical habitat that may be affected by section 7 implementation for the mussels. Importantly, these estimates include the effects of section 7 implementation for all activities associated with the proposed critical habitat area. *As such, this section does not distinguish impacts that may be attributable co-extensively to the listing of the mussels from those impacts attributable solely to the critical habitat designation.*

113. This section begins with a summary of the categories of economic impact associated with section 7 implementation for the mussels. It then provides a list of the activities likely to be affected section 7 implementation.

3.1 Categories of Economic Impacts Associated with Section 7 Implementation

114. The following section provides an overview of the categories of economic impacts that are likely to arise due to the implementation of section 7 in the geographic area proposed as critical habitat for the mussels.

3.1.1 Technical Assistance

115. The Service may respond to requests for technical assistance from Federal or State agencies, local municipalities, and private landowners and developers with questions regarding whether specific activities may affect a listed species or its critical habitat. Technical assistance costs represent the estimated economic costs of informational conversations between stakeholders and the Service regarding such potential effects. These technical assistance activities are characteristically low effort voluntary actions between two parties, the Service and the stakeholder. The stakeholder may or may not be a Federal agency, as opposed to section 7 consultation which by definition involves a Federal nexus with or without private third party involvement.

116. In some instances, technical assistance may involve a request for general review of a project or activity that is not subject to section 7 requirements (e.g., activity on private land without a Federal nexus) as a safeguard to ensure adequate protection for species and habitats of concern. For example, although development of water quality standards within a State requires a section 7 consultation, a State agency may request technical assistance from the Service as an additional precaution to ensure that individual NPDES permits conforming to these standards adequately provide for relevant species and habitat. Although technical assistance is not a direct cost of section 7 of the Act, these costs are incorporated into the cost analysis when they are explicitly propagated by consideration of species and habitat conservation.

3.1.2 Section 7 Consultations

117. The costs of these efforts are an important component of the impacts assessment. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

118. In some cases, consultations will involve the Service and another Federal agency only, such as the USACE or the EPA. In addition, they may also include a third party, such as State agencies or private landowners involved in projects on non-Federal lands with a Federal nexus.

119. During a consultation, the Service, the Action agency, and the landowner applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the region where critical habitat has been proposed, and the involved parties.

120. Section 7 consultations with the Service may be either informal or formal. Informal consultation, which consists of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, is designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a formal consultation is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in its Biological Opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, and

recommendations to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

121. Estimates of the cost of formal and informal individual consultations for the Service were developed from a review and analysis of historical section 7 files from the Service's Cookeville field office. These estimates were based on a review of over 6,000 technical assistance efforts, informal, and formal consultations dating back to 1997 in Tennessee and Kentucky. Average annual staff time for each category was used to estimate time for a Service biologist to complete each action.[55] Staff time was then multiplied by the appropriate labor rate for staff from the Service.

122. Estimates of the cost of formal and informal individual consultations for all other entities were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

123. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during both formal and informal consultations, as well as the varying complexity of consultations. Section 7 consultation costs include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and in some cases, developing a biological assessment or biological opinion. Biological assessments (BAs) are prepared to determine whether proposed projects, and in some cases their alternatives, are likely to adversely affect the listed species or designated critical habitat. Biological assessments include a survey of the literature, a detailed discussion of the effects of the action and listed species or critical habitat, and findings based on this information.

124. Per-unit costs associated with formal consultations, informal consultations, and technical assistance calls are presented in Exhibit 3-1. Unless stated otherwise, this table is used to develop total administrative costs for consultations associated with activities within proposed critical habitat for the mussels.

[55] The estimated time for a Service biologist to complete a technical assistance request is approximately ten minutes. The estimated time for a Service biologist to complete a low complexity informal consultation is approximately 30 minutes, and a high level informal consultation is three hours. The estimated time for a Service biologist to complete a low complexity formal consultation is approximately 12 hours, and a high level formal consultation is 72 hours.

Exhibit 3-1

ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS FOR THE MUSSELS (PER EFFORT)[a]

Critical Habitat Impact	Scenario	Service[b]	Action Agency	Third Party	Biological Assessment[c]
Technical Assistance	Low	$10	N/A	$600	$0
	High	$10	N/A	$1,500	$0
Informal Consultation[d]	Low	$30	$1,300	$1,200	$0
	High	$190	$3,900	$2,900	$6,600
Formal Consultation	Low	$760	$3,900	$2,900	$6,600
	High	$4,540	$6,500	$4,100	$6,600

[a] Low and high estimates primarily reflect variations in staff wages and time involvement by staff.
[b] Service estimates are based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, and records from the Service's Cookeville field office.
[c] A third party is assumed to bear the cost of a biological assessment. When no third party is involved, the Action Agency bears the cost, and the bearing of this cost varies from agency to agency.
[d] Internal consultations are approximately the same cost as informal consultations, unless indicated otherwise. For internal consultations, the Service bears the costs normally borne by both the Service and the Action Agency.
Sources: IEc analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country, and communications with Biologists in the Service.

3.1.3 Project Modifications

125. The section 7 consultation process may involve some modifications to a proposed project. Projects may be modified in response to voluntary conservation measures suggested by the Service during the *informal* consultation process in order to avoid or minimize impact to a species and/or its habitat, thereby removing the need for formal consultation. Alternatively, *formal* consultations may involve modifications that are agreed upon by the Action agency and the third party and included in the project description as avoidance and minimization measures, or included in the Service's biological opinion on the proposed action as reasonable and prudent measures (RPMs) and/or discretionary conservation recommendations to assist the Action agency in meeting their obligations under section 7(a)(1) of the Act.[56]

126. In some cases, the Service may determine that the project is likely to jeopardize the continued existence of the species and/or destroy or adversely modify its designated critical habitat. In these cases the Service will provide the Action agency with reasonable and prudent alternatives (RPAs) that will keep the action below the thresholds of jeopardy and/or adverse modification. An RPA is an alternative that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with

[56] Section 7(a)(1) requires Federal agencies to utilize their authorities to further the purposes of the Act by carrying out programs for the conservation of listed species.

the scope of the Action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. These RPAs are typically developed by the Service in cooperation with the Action agency and, when applicable, the third party. Alternatively, the Action agency can develop its own RPAs, or seek an exemption for the project. All of these project modifications have the potential to represent some cost to the Action agency and/or the third party. In certain instances, these modifications can lead to broader regional economic impacts.

127. Because of the difficulty generating estimates of potential modifications to specific projects on a case-by-case basis, this analysis models modifications for average or "typical" projects likely to affect the proposed critical habitat of the mussels. Actual modification costs are likely to vary according to the specific characteristics of individual projects and consultation outcomes. Estimated costs of project modifications are detailed following the descriptions of the related activities in Section 4 of this analysis.

3.1.4 Regional Economic Impacts

128. The consultation process and related project modifications could directly affect the operations of entities in some industries (e.g., agriculture producers and residential developers), with secondary impacts on the suppliers of goods and services to these industries, as well as purchasers of productions from these industries. For example, modified or decreased grazing and haying activities could affect businesses providing agricultural equipment and supplies. Thus, project modifications or other restrictions that engender cost and revenue impacts involving commercial enterprises can have a subsequent detrimental effect on other sectors of the local economy, especially when the affected industry is central to the local economy. Industries within a geographic area are interdependent in the sense that they purchase output from other industries and sectors, while also supplying inputs to other businesses. Therefore, direct economic effects on a particular enterprise can affect regional output and employment in multiple industries.

129. Many methods are available for conducting economic impact assessments, depending on the particular policy interests and goals of the economic analysis. Use of an input-output (I-O) model, such as IMPLAN, to gauge the direction and magnitude of regional economic impacts is useful in situations where the critical habitat designation may affect the commercial economy of a specific geographic area. However, I-O modeling is not appropriate for all economic impact analyses associated with critical habitat areas and can result in misinterpretations and biased conclusions if used inappropriately. I-O models are appropriate when the following factors are present: (1) economic impacts of the proposed designation are substantial and clearly defined in the analysis; (2) impacts have a clear effect on one industry or groups of industries prevalent in the geographic region; and (3) substitution possibilities for the focal economic input or activity are not widely available.

130. A regional economic analysis was not performed for this economic analysis as, due to the nature of the activities affected by this designation, section 7 consultation and associated project modifications are unlikely to measurably reduce the level of economic activity. While increased administrative costs are projected, only minimal project modifications resulting from the designation are forecast.

3.2 Activities Potentially Affected by Critical Habitat Designation

131. Numerous Action agencies carry out, permit, or fund activities and projects in or adjacent to proposed critical habitat areas. These activities may lead to section 7 consultation with the Service, and in some cases specific projects may be modified in order to protect the mussels and/or their habitat. This section provides a list of activities likely to be affected by section 7 implementation. The following land use activities are likely to be affected by implementation of section 7 of the Act:

- Road/Bridge Construction and Maintenance
- National Forest Activities
- National Park Activities
- Gravel Dredging and Excavation
- Conservation and Recreation
- Agricultural Activities
- Coal Mining
- Oil and Gas Development
- Water Quality Activities
- Utilities (water pipelines, stormwater projects, transmission lines)

The following land use activities are unlikely to incur major section 7 impacts:

- Residential and Related Development
- Dams/Reservoirs
- Power Plants
- Silviculture

132. This section identifies and evaluates the economic impact of activities within and/or affecting the proposed critical habitat designation as well as the location, nature, and extent of future activities that may be affected by section 7 implementation in the critical habitat area. This discussion includes a description of each activity, how these activities could be affected, the number of expected section 7 informal and formal consultations, and the associated administrative and project modification costs by activity in the proposed critical habitat units.

133. First, this section quantifies the costs of the anticipated consultations, associated project modifications, and technical assistance by activity. Importantly, these estimates include all section 7-related consultations and technical assistance efforts associated with the proposed critical habitat area. As such, this analysis does not distinguish impacts that may be attributable co-extensively to the listing of the mussels from those impacts attributable solely to the designation. This section also provides a detailed description of each anticipated consultation and technical assistance effort by activity. Exhibit 4-1 summarizes the resulting total costs associated with section 7 activity by activity. Exhibit 4-1 summarizes the resulting total costs associates with section 7 activity by unit and area. Further detailed costs of each activity according to unit and activity are provided in Appendix D. Exhibit 4-4 highlights the major assumptions made throughout this analysis, and offers information on the potential direction of cost bias generated by these assumptions.

4.1 Estimated Total Costs of Section 7

134. Several Action agencies carry out, permit, or fund activities and projects in or adjacent to proposed critical habitat areas. These activities may lead to section 7 consultation with the Service, and in some cases specific projects may be modified in order to protect the mussels and their habitat. ***This analysis predicts that transportation and national forest activities will be the activities most heavily impacted by section 7 consultation for the mussels.*** Transportation costs will be greatest in Unit 4 Powell River and Unit 1 Duck River, and national forest costs will be distributed in Area 3 Rockcastle River, Unit 8 Rock Creek, Unit 11 Sinking Creek, and Unit 12 Marsh Creek.

135. This analysis forecasts 697 to 874 informal and 76 to 109 formal section 7 consultations regarding the mussels over the next ten years. Most of the cost of this designation (79 percent) is comprised of the administrative costs associated with consultations. Because current State and Federal regulations provide a high level of baseline protection, project modifications are not expected to result in a large proportion of total costs.

136. Estimates of the economic impact associated with section 7 consultations for the mussels, discounted to present value using a rate of seven percent, range from $4.2 million to $11.2 million over ten years (or $0.6 million to $1.6 million annually).[57] While a range of activities may be affected by the designation of critical habitat for the mussels, the activities most impacted by the designation are road/bridge construction and maintenance projects (37 percent) and national forest activities (22 percent). The remaining costs are associated with agriculture (nine percent), utilities (eight percent), water quality (seven percent), technical assistance (five percent), oil and gas drilling (four percent), conservation and recreation (three percent), gravel dredging (two percent), coal mining (one percent), and national park activities (one percent).

137. The cost estimates presented in Exhibit 4-1 are a function of the estimated number of consultations and project modifications associated with activities affecting the proposed critical habitat for the mussels, along with the per effort costs outlined in Exhibit 3-1, presented by activity.

[57] These estimates have been converted to present values using a seven percent discount rate and include impacts that are co-extensive with other aspects of section 7 of the Act (see Exhibit 4-4). Costs in the present value calculation are distributed evenly over the ten year time frame as Action agencies were unable to provide specific timing of expected consultations.

Exhibit 4-1

ESTIMATED TOTAL ECONOMIC COSTS OF ASSOCIATED ACTIVITIES (TEN YEARS)

Activity	No. of Informal/ Formal Consultations	Informal Consultation	Formal Consultation	Project Modifications	Total Costs
Transportation	110/62	$160,000 to $1,490,000	$850,000 to $1,440,000	$1,590,000 to $3,050,000	$2,600,000 to $5,990,000
Forest Service	200/10	$1,030,000 to $3,340,000	$0 to $240,000	$0	$1,030,000 to $3,570,000
Agriculture	237/12	$650,000 to $1,190,000	$80,000 to $260,000	$0	$740,000 to $1,450,000
Utilities	120/4	$170,000 to $1,150,000	$10,000 to $90,000	$40,000	$220,000 to $1,280,000
Water Quality	36/7	$120,000 to $710,000	$70,000 to $190,000	$180,000 to $250,000	$370,000 to $1,150,000
Oil and Gas Drilling	50/0	$480,000 to $680,000	$0	$0	$480,000 to $680,000
Conservation and Recreation	84/1	$110,000 to $520,000	$10,00 to $20,000	$0	$120,000 to $540,000
Gravel Dredging	5/11	$10,000 to $70,000	$70,000 to $240,000	$0	$80,000 to $310,000
National Park Service	8/1	$20,000 to $100,000	$10,000 to $20,000	$0	$30,000 to $120,000
Coal Mining	24/0	$30,000 to $80,000	$0	$0	$30,000 to $80,000
Development	0/0	$0	$0	$0	$0
Dams/Reservoirs	0/0	$0	$0	$0	$0
Power Plants	0/0	$0	$0	$0	$0
Silviculture	0/0	$0	$0	$0	$0
Other	0/1	$6,000 to $10,000	0	0	$6,000 to $10,000
Technical Assistance					$280,000 to $800,000
TOTAL	**874/109**	**$2,760,000 to $9,330,000**	**$1,130,000 to $2,510,000**	**$1,800,000 to $3,340,000**	**$5,980,000 to $16,000,000**

Note: Numbers may not sum due to rounding. Other costs include the TVA programmatic consultation.
Source: Based on past consultation records and conversations with Federal agencies potentially affected by the proposed critical habitat designation.

138. Based on the consultation history provided by the Service, the activities generating the most consultation activity were transportation (35 percent), utilities (13 percent), oil spill response (12 percent), recreation (six percent), and internal consultations within the Service (five percent). Most of these consultations were initiated by State departments of transportation (29 percent). Other action agencies frequently involved included the Service (24 percent), third parties, such as utility companies, counties, etc. (16 percent), USACE (nine percent), and FHWA (six percent). See Exhibit 4-2 for a direct comparison of past consultations with the expected occurrence of future consultations.

139. Transportation continues to be the activity most impacted by this designation. The forecast increase in national forest activity consultations are due to the lifting of a 1997 court order restricting timber harvest in the Daniel Boone National Forest. The forecast increase in agriculture consultations are due to NRCSs anticipation of an increase in future consultations. Utility and recreation consultations are expected to decrease in the overall contribution of consultations based on the anticipated increase in rate of consultation associated with other activities. No consultations regarding oils spills are anticipated since all historic oil spill consultations were related to one spill event. Intra-agency consultations are forecast to decrease since many of the historical consultations were regarding the recovery plan, the draft of which is now available, and is unlikely to require consultations in the future.

Exhibit 4-2

COMPARISON OF HISTORIC AND PROJECTED CONSULTATIONS RANKED BY OCCURRENCE

Most Frequent Activities Consulted On		Action agencies Most Frequently Involved	
Historic	**Projected**	**Historic**	**Projected**
Transportation	Transportation	State Departments of Transportation	State Departments of Transportation
Utilities	National Forest Activities	Fish and Wildlife Service	Forest Service
Oil Spill	Agriculture	Third Parties	NRCS
Recreation	Utilities	USACE	USACE/TVA
Intra-Agency	Water Quality	FHWA	EPA

Note: Based on the consultation history regarding the mussels provided by the Service's Cookeville, Abingdon, and Daphne field offices.

140. The cost estimates presented in Exhibit 4-3 are a function of the assumed number of consultations, technical assistance, and project modifications associated with activities affecting the proposed critical habitat for the mussels, along with the per effort costs outlined in Exhibit 3-1, presented by critical habitat unit.

Exhibit 4-3

ESTIMATED TOTAL ECONOMIC COSTS OF SECTION 7 BY UNIT AND AREA (TEN YEARS)

Units	No. of Informal/Formal Consultations[a]	Technical Assistance	Informal Consultation	Formal Consultation	Project Modification Costs	Total Costs[b]
1 Duck River	50/9	$0	$50,000 to $530,000	$110,000 to $210,000	$30,000 to $370,000	$190,000 to $1,100,000
2 Bear Creek	14/2	$10,000 to $50,000	$20,000 to $140,000	$20,000 to $50,000	$310,000 to $350,000	$360,000 to $590,000
3 Obed River	48/2	$0	$120,000 to $310,000	$10,000 to $40,000	$10,000 to $140,000	$140,000 to $490,000
4 Powell River	46/19	$0 to $10,000	$110,000 to $480,000	$310,000 to $470,000	$230,000 to $290,000	$660,000 to $1,250,000
5 Clinch River	74/14	$180,000 to $460,000	$180,000 to $680,000	$220,000 to $350,000	$150,000 to $180,000	$740,000 to $1,680,000
6 Nolichucky River	16/1	$0	$10,000 to $140,000	$10,000 to $30,000	$0 to $30,000	$20,000 to $200,000
7 Beech Creek	36/0	$0	$100,000 to $210,000	$0	$0 to $20,000	$100,000 to $230,000
8 Rock Creek	35/3	$0 to $10,000	$190,000 to $570,000	$0 to $80,000	$0	$190,000 to $660,000
9 Big South Fork	93/6	$0	$550,000 to $990,000	$70,000 to $130,000	$210,000 to $350,000	$830,000 to $1,480,000
10 Buck Creek	30/15	$0 to $10,000	$60,000 to $180,000	$110,000 to $330,000	$100,000	$270,000 to $610,000
11 Sinking Creek	52/8	$0 to $10,000	$230,000 to $670,000	$40,000 to $190,000	$100,000	$370,000 to $970,000
12 Marsh Creek	52/7	$0	$230,000 to $670,000	$30,000 to $170,000	$0	$260,000 to $840,000
13 Laurel Fork	14/0	$0 to $20,000	$50,000 to $100,000	$0	$0	$50,000 to $120,000
Unassigned[c]	35/1	$60,000 to $150,000	$120,000 to $690,000	$10,000 to $30,000	$110,000 to $150,000	$290,000 to $1,010,000
Subtotal	**594/88**	**$250,000 to $720,000**	**$2,020,000 to $6,3600,000**	**$940,000 to $2,080,000**	**$1,250,000 to $2,080,000**	**$4,470,000 to $11,230,000**

Exhibit 4-3

ESTIMATED TOTAL ECONOMIC COSTS OF SECTION 7 BY UNIT AND AREA (TEN YEARS)

Units	No. of Informal/Formal Consultations[a]	Technical Assistance	Informal Consultation	Formal Consultation	Project Modification Costs	Total Costs[b]
Areas						
1 French Broad River	87/12	$0	$130,000 to $550,000	$70,000 to $240,000	$50,000 to $460,000	$250,000 to $1,260,000
2 Holston River	88/5	$0	$130,000 to $660,000	$50,000 to $90,000	$40,000 to $310,000	$210,000 to $1,070,000
3 Rockcastle River	105/4	$20,000 to $50,000	$470,000 to $1,740,000	$60,000 to $90,000	$400,000	$950,000 to $2,280,000
Unassigned[b]	1/1	0	$10,000 to $20,000	$10,000 to $30,000	$70,000 to $100,000	$90,000 to $150,000
Subtotal	**281/14**	**$20,000 to $50,000**	**$740,000 to $2,970,000**	**$190,000 to $450,000**	**$560,000 to $1,270,000**	**$1,500,000 to $4,750,000**
TOTAL	**874/109**	**$270,000 to $770,000**	**$2,760,000 to $9,330,000**	**$1,130,000 to $2,530,000**	**$1,810,000 to $3,350,000**	**$5,980,000 to $16,000,000**

[a] Maximum number of informal and formal consultations.
[b] Technical assistance costs are allotted by unit based on the distribution of formal and informal consultations. These costs are included in Total Costs only.
Note: Totals may not sum due to rounding.
[c] Unassigned costs include Special Appropriation Projects and Technical Assistance.

141. Based on this analysis, the total nominal cost of consultations, technical assistance, and resultant project modifications will range from $6 million to $16 million over the next ten years. Most consultation activity (and related costs) will occur in Area 3 Rockcastle River (14 percent). The high costs in Area 3 Rockcastle River are due primarily to the presence of Daniel Boone National Forest. The Daniel Boone National Forest consultations with the Service are comprehensive as all 32 threatened and endangered species that occur in the forest in are considered in each consultation. Costs of these consultations may be reduced in the future as consultations are streamlined and consultation requirements become more clear.

142. After Area 3 Rockcastle River the highest costs occur in Unit 5 Clinch River (11 percent), Unit 9 Big South Fork (nine percent), Area 1 French Broad River (eight percent), and Unit 4 Powell River (eight percent). No one activity is driving the unit or area costs, high costs are attributable to the size of the unit or area. Unit 5 Clinch River, Unit 9 Big South Fork, Area 2 Holston River, and Unit 4 Powell River are the largest four units and areas.

143. The cost estimates presented in Exhibit 4-4 are a function of the assumed number of consultations, technical assistance, and project modifications associated with activities affecting the proposed critical habitat, presented by party.

Exhibit 4-4
ESTIMATED TOTAL ECONOMIC COSTS BY PARTY
(TEN YEARS)

	Service	Action Agency	Third Party
Administrative Costs			
Low	$90,000	$2,400,000	$1,690,000
High	$630,000	$6,470,000	$5,530,000
Project Modifications			
Low	$0	$40,000	$1,770,000
High	$0	$40,000	$3,300,000
Total Costs			
Low	$90,000	$2,440,000	$3,450,000
High	$630,000	$6,510,000	$8,830,000
Note: Totals may not sum due to rounding.			

144. Most of the costs of the designation will be borne by third parties (55 percent of total costs), followed by Action agencies (41 percent of total costs). Administrative costs account for 79 percent of total costs ($4.2 million to $12.6 million), and technical assistance accounts for about six percent ($0.3 million to $0.8 million) of the total administrative costs. The cost burden to third parties is expected to be the greatest as these entities are likely to bear the cost of project modification in most cases. Further, the administrative costs of consultation and technical assistance is anticipated to be greater for third parties than the Service.

145. Exhibit 4-5 presents the discounted present value of total costs by applying a seven percent discount rate, assuming that total costs are distributed evenly over the ten-year period.

Exhibit 4-5

PRESENT VALUE OF ESTIMATED TOTAL ECONOMIC COSTS (TEN YEARS)

	Total Section 7 Costs	
	Low	**High**
Total Activity Costs	$6.0 million	$16.0 million
Present Value (7%)	$4.2 million	$11.2 million
Annualized (7%)	**$0.6 million**	**$1.6 million**

Note: This table presents nominal costs as well as discounted present value of total costs based on a seven percent discount rate, with the assumption that total costs are distributed evenly over the ten-year period. Discounted costs are then annualized.

146. While the total estimated economic costs associated with section 7 implementation for the mussels appear high, they must be considered in the context of the value of the economic activity that is predicted to occur over the next ten years in the region. In 2002, the value of annual economic activity in the counties that encompass the proposed critical habitat designation in Mississippi, Alabama, Tennessee, Kentucky, and Virginia exceeded $12 billion.[58] Thus, the estimated upper-bound of annual present value costs associated with the listing and proposed critical habitat designation for the mussels ($1.6 million) represents one-thousandth of one percent of the total value of annual economic activity in this region. The total cost of road and bridge construction and maintenance ($6 million) is less than one-tenth of one percent of the total annual operating budget of affected State departments of transportation ($7.3 billion).[59] The highest per project cost ($125,000) is approximately one percent of the average bridge project cost ($11.7 million).[60]

147. Exhibit 4-6 presents the key assumptions of this economic analysis, as well as the potential direction of bias introduced by the assumptions.

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[58] U.S. Census Bureau, 2000 County Business Patterns, accessed at http://censtates.census.gov/cbpnaic/cbpnaic.shtml on May 23, 2003.

[59] Tennessee Department of Transportation. Governor's Highway Work Program Reflects State Budget Reductions. Accessed at http://www.tdot.state.tn.us/roadprojects/statewide.htm, June 2, 2003. Virginia Department of Transportation. 2003. Virginia Department of Transportation Annual Budget Fiscal Year 2003-2004. Accessed at http://www.virginiadot.org/infoservice/resources/fin-04budget-tentative.pdf, June 2, 2003. Kentucky Transportation Cabinet. 2002. Revenue Assumptions For FY 2003-2008 Six Year Highway Program. Accessed at http://www.kytc.state.ky.us/progmgmt/2002-syp/Revenue_Assumptions.pdf, June 2, 2003. Alabama Department of Transportation. 2000. Alabama Statewide Transportation Plan. Accessed at http://www.dot.state.al.us/transplanning/stateplan.pdf, June 2, 2003. Mississippi Department of Transportation. 2002. Annual Report 2002. Accessed at http://www.gomdot.com/news/annual_reports/fy_2002_annual_report/02_financials.pdf, June 2, 2003.

[60] Kentucky Transportation Cabinet. 2002. Kentucky Transportation Cabinet 2002 Six Year Highway Plan FY - 2002 Thru FY - 2008.

Exhibit 4-6

CAVEATS TO THE ECONOMIC ANALYSIS

Key Assumption	Effect on Cost Estimate
The rate of formal and informal consultations will not decrease over time.	+
The presence of other threatened and endangered species with and without critical habitat (i.e., spotfin chub, yellowfin madtom, slender chub, etc.) has no influence on consultation/project modification costs.	+
The historic occurrence and cost of project modifications are good predictors of future consultation costs.	+/-
Action agency Best Management Practices are baseline protections that are practiced consistently and as such, do not introduce additional costs to section 7 consultations.	+/-
All costs to development are captured by increased costs of construction of pipelines, water supply and wastewater infrastructure, and roads and bridges within the proposed critical habitat.	+/-

- : This assumption may result in an underestimate of real costs.
+ : This assumption may result in an overestimate of real costs. Multiple "+" keys refer to the magnitude of effect anticipated.
+/- : This assumption has an unknown effect on estimates.

4.2 Activities Potentially Affected by Section 7

148. This section provides context to the results presented in Section 4.1. After each land use activity is introduced it is discussed with reference to: relevant baseline protections that commonly benefit the mussels; the number and specifics of each anticipated consultation effort; and the project modification types and costs that may result from each consultation.

4.2.1 Road/Bridge Construction and Maintenance

149. A significant number of road/bridge construction and maintenance activities may occur within the proposed critical habitat area during the next ten years. Potential road/bridge projects that can adversely affect the mussels include: bridge construction and maintenance, expansion or improvement of the existing public road network, and construction or improvement of private roads.

Baseline

150. In addition to CWA regulations and FHWA BMPs for erosion and sediment control, road and bridge projects are bound by various State regulations that may provide baseline protections to the mussels. FHWA BMPs are required for federally funded construction

projects unless State requirements are more stringent.[61] BMPs of the State departments of transportation include baseline protections to the mussels. Sediment control measures, re-vegetation, restrictions on work within outstanding resource waters, national wild and scenic rivers, State wild and scenic river systems, and Federal and State wildlife management areas, time of year (flow) restrictions, and design initiatives are all examples of State BMPs.[62] State water quality standards also provide some baseline protection, for example the Tennessee Water Control Board requires permit applicants to evaluate practicable alternatives and conduct avoidance, minimization, and/or mitigation for activities impacting water.[63]

Future Consultations

151. The typical Federal nexuses for road/bridge construction and maintenance activities are funding from the FHWA for ALDOT, KTC, MSDOT, TDOT, and VDOT projects, and/or CWA §404 permitting from the USACE for projects with the potential to discharge dredged or fill material into navigable waters of the United States, and/or 26(a) permitting from the TVA for projects in the Tennessee River watershed that may impact navigation, flood control, or public lands.

152. This analysis anticipates 61 to 110 informal consultations and 54 to 62 formal consultations associated with road/bridge construction and maintenance activities during the next ten years.[64] The administrative costs of consultations for road/bridge construction and maintenance will range from $1,010,000 to $2,930,000 ($160,000 to $1,490,000 for informal consultation and $850,000 to $1,440,000 for formal consultation).[65]

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[61] Federal Highway Administration. 1995. Best Management Practices for Erosion and Sediment Control - Final Report October 1988- June 1995. Federal Highway Administration, Washington, D.C. Eastern Federal Lands Highway Design. FHWA/FLP-94/005.

[62] Kentucky Transportation Cabinet. 2000. Best Management Practices for Maintenance Activities in and Around Streams. Tennessee Department of Transportation. 1995. Standard Specifications For Road and Bridge Construction. Alabama Department of Environmental Management, *Alabama's Best Management Practice's for Forestry;* and Alabama Soil and Water Conservation Committee, *Alabama Handbook For Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas*, July 2002.

[63] Tennessee. Code Ann., §69-3-101.

[64] Personal communication with Michael Hardin, Kentucky Transportation Cabinet, February 4, 2003. Personal communication with Olivia Michael, Federal Highway Administration, Kentucky Division, February 10, 2003. Personal communication with Lilah Miller, Tennessee Department of Transportation, February 7, 2003. Personal communication with Charles Bush Tennessee Department of Transportation, February 27, 2003. Personal communication with Mark Doctor, Federal Highway Administration, Tennessee Division, February 13, 2003. Personal communication with Cecil Vick, Federal Highway Administration, Mississippi Division, February 13, 2003. Personal communication with Paul Rigby, Mississippi Department of Transportation Office of State Aid Road Construction, February 13, 2003. Personal communication with B.G. Cogin Jr., Tishimingo County Engineers Office, February 13, 2003. Personal communication with Jeffery Southard, Chief of Transportation Planning and the Environment, Virginia Department of Transportation, February 18, 2003. Personal communication with John Shill, Alabama Department of Transportation, February 18, 2003.

[65] See Exhibit 3-1. Note: VDOT's administrative costs are higher than those presented in Exhibit 3-1. VDOT anticipates a $9,800 cost for a formal site survey and biological assessment for each formal consultation.

- TDOT anticipates engaging in approximately 45 to 79 informal and 15 to 23 formal consultations with the Service over the next ten years on bridge replacement, maintenance, and rehabilitation and road work projects.[66] These consultations are parsed by unit and area accordingly:

    - Unit 1 Duck River seven to 19 informal and five formal;
    - Unit 3 Obed River six to seven informal and one to two formal;
    - Unit 4 Powell River up to four informal;
    - Unit 5 Clinch River up to two informal;
    - Unit 6 Nolichucky River up to two informal;
    - Unit 7 Beech Creek up to one informal;
    - Unit 9 Big South Fork five to eight informal and one to two formal;
    - Area 1 French Broad River 15 to 20 informal and five to ten formal; and
    - Area 2 Holston River 12 to 16 informal and three to four formal.

- The Mississippi Division of the FHWA anticipates one informal consultation regarding the Corridor V project over the next ten years; this project will affect Unit 2 Bear Creek.[67] No other consultations are anticipated at the State or county level.[68]

- ALDOT anticipates engaging in approximately two informal consultations with the Service over the next ten years on bridge replacement, maintenance, and rehabilitation, and road construction.[69] These projects will affect the Unit 2 Bear Creek.

- KTC anticipates engaging in approximately nine formal consultations with the Service over the next ten years on bridge replacement, maintenance, and rehabilitation, road construction, and landslide repair.[70] KTC anticipates one formal consultation on Unit 10 Buck Creek, three formal consultations on Unit 9 Big South Fork, one formal consultation on Unit 11 Sinking Creek, and four formal

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[66] Personal communication with Charles Bush, Transportation Manager, Environmental Planning and Permits, Environmental Impact Section, Tennessee Department of Transportation, February 27, 2003, May 6, 2003. Personal communication with Lilah Miller, Tennessee Department of Transportation, February 7, 2003.

[67] Personal communication with Cecil Vick, Federal Highway Administration, Mississippi Division, February 13, 2003.

[68] Personal communication with Paul Rigby, Mississippi Department of Transportation Office of State Aid Road Construction, February 13, 2003. Personal communication with B.G. Cogin Jr., Tishimingo County Engineers Office, February 13, 2003.

[69] Personal communication with John Shill, Alabama Department of Transportation, February 18, 2003.

[70] Personal communication with Michael Hardin, Kentucky Transportation Cabinet, February 4, 2003. Kentucky Transportation Cabinet also indicated consultations may occur regarding guardrail installation projects. The Service does not anticipate consulting on guardrail installation projects. Personal communication with U.S. Fish and Wildlife Service staff, May 14, 2003.

consultations on Area 3 Rockcastle River.

- VDOT anticipates engaging in approximately 28 formal consultations with the Service over the next ten years on projects which would cross the Clinch or the Powell River, such as road construction, and bridge replacement, maintenance, and rehabilitation.[71] VDOT anticipates 11 formal consultations on Unit 5 Clinch River, and 17 formal consultations on Unit 4 Powell River.

- USACE anticipates engaging in approximately 13 to 28 informal and two formal consultations with the Service over the next ten years on county and private bridge replacement, construction, maintenance, and rehabilitation, and road construction. These consultations are in addition to the State and federally funded projects discussed above.[72] These consultations are parsed by unit and area accordingly:

    - Unit 1 Duck River two informal;
    - Unit 2 Bear Creek one to two informal;
    - Unit 3 Obed River one to two informal;
    - Unit 4 Powell River one informal and one formal;
    - Unit 5 Clinch River up to one informal and one formal;
    - Unit 6 Nolichucky River one to two informal;
    - Unit 7 Beech Creek one to two informal;
    - Unit 8 Rock Creek one informal;
    - Unit 9 Big South Fork one informal;
    - Unit 10 Buck Creek one to two informal;
    - Unit 11 Sinking Creek one to two informal;
    - Unit 12 Marsh Creek one to two informal;
    - Unit 13 Laurel Fork one to two informal;
    - Area 1 French Broad River up to two informal;
    - Area 2 Holston River up to three informal; and
    - Area 3 Rockcastle River up to one informal.

Project Modifications

153. The per project costs of project modifications for road/bridge construction and maintenance will range from $1,800 to $115,000, depending on project scope as described below.

- Mussel relocation efforts can range from $1,800 to $5,000 per crew day, and for

[71] Personal communication with R. C. Woody, Virginia Department of Transportation, March 18, 31, 2003.

[72] Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003, May 6, 2003. Personal communication with Alice Allen-Grimes, Regulatory Branch, USACE Norfolk District Office, Norfolk, Virginia, April 11, 2003. Personal communication with Kathey S. Perdue, Regulatory Branch, USACE Norfolk District Office, Norfolk, Virginia, April 17, 2003.

small scale relocation projects can take one to three days ($1,800 to $15,000 total).[73] VDOT anticipates their mussel relocation efforts will cost $2,000.[74]

- Increasing the span of a bridge 50 to 100 feet will cost approximately $100,000.[75]
- Construction monitoring will cost approximately $6,500.[76]
- Post construction monitoring will cost approximately $5,000.[77]

154. The total costs of project modifications will range from $1,590,000 to $3,140,000 based on the following:

- TDOT bridge replacement, maintenance, rehabilitation, and road work may necessitate mussel relocation efforts.
- The bridge projects involving Unit 2 Bear Creek, where ALDOT and FHWA (within Mississippi) are the lead Action agencies, will result in three informal consultations. Increasing the span of the bridge and mussel relocation are likely to be recommended by the Service.
- For the eight of the nine formal consultations for bridge projects where KTC is the lead Action agency, the Service will likely recommend increasing the span of the bridge.[78]
- The landslide repair project involving Unit 9 Big South Fork, where KTC is the lead Action agency, will result in one formal consultation, and no project modifications are likely to be recommended by the Service.
- For all 28 formal consultations regarding stream crossing projects anticipated by VDOT, the Service is likely to recommend mussel relocation, construction monitoring, and post construction monitoring.[79]

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[73] Personal communication with Third Rock Consultants, February 19, 2003. Personal communication with Charles Nicholson, John Jenkinson, and Peggy Shute, Meeting with the Tennessee Valley Authority, January 30, 2003.

[74] Personal communication with R. C. Woody, Virginia Department of Transportation, March 31, 2003.

[75] Personal communication with John Shill, Alabama Department of Transportation, February 18, 2003.

[76] Personal communication with R. C. Woody, Virginia Department of Transportation, March 31, 2003.

[77] Personal communication with R. C. Woody, Virginia Department of Transportation, March 31, 2003.

[78] Personal communication with Olivia Michael, Federal Highway Administration, Kentucky Division, February 24, 2003.

[79] Personal communication with R. C. Woody, Virginia Department of Transportation, March 31, 2003.

- For the 13 to 28 informal and two formal consultations where USACE is the lead Action agency, no additional project modifications are likely to be recommended by the Service.

4.2.2 Agricultural Activities

155. Agriculture is a common land use in the areas surrounding the proposed critical habitat designation. Most activities on private land generally do not constitute a Federal nexus unless some type of Federal funding is involved or a Federal permit is required. However, agricultural activities can have a Federal nexus if a rancher or farmer receives a loan or grant from the Federal Farm Service Agency (FSA), or receives a grant from the NRCS to voluntarily adopt conservation practices that improve or maintain the quality of the natural resources in the area, such as through the Environmental Quality Incentives Program. The following agricultural activities may involve a Federal nexus and be subject to section 7 of the Act: agricultural operation improvements funded through the FSA or the Farm Bill, and conservation activities, such as bank stabilization projects, funded by the FSA and/or the NRCS. Potential agricultural activities which can adversely affect the mussels include: construction or improvement of private roads, bank stabilization, wildlife management, and stream crossings.

Baseline

156. The NRCS field office's Conservation Practice Standard for stream bank and shoreline protection and BMPs of the State Departments of Agriculture include baseline protections to the mussels.[80] NRCS program participation is voluntary but if a contract is signed, as with any cost sharing activities, BMPs and conservation practice standards are mandatory. Both NRCS and State Departments of Agriculture BMPs require minimization of erosion and sedimentation during construction, revegetation after construction, preservation or replacement of habitat forming elements, and implementation of measures to minimize livestock in the stream area. State water quality standards also provide some baseline protection to the mussels by prescribing numeric limits for specific physical, chemical, biological, and radiological characteristics of water.[81]

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[80] NRCS, Kentucky Field Office, Tennessee Field Office, Alabama Field Office, Mississippi Field Office, Virginia Field Office. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.

NRCS, Kentucky Field Office, Mississippi Field Office. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Stream Crossing (Interim).

NRCS, Kentucky Field Office, 2003. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Stream Habitat Improvement and Management.

NRCS, Kentucky Field Office, Tennessee Field Office. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Forest Stand Improvement.

NRCS, Kentucky Field Office, Tennessee Field Office, Alabama Field Office. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Wetland Wildlife Habitat Management.

[81] Virginia Code Ann, §62.1-44.15(3a). Tennessee Code Ann., §69-3-101. Kentucky Revised Statutes §401.5:031. State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters, Adopted

Future Consultations

157. The typical Federal nexuses for agricultural activities are either funding from the NRCS, and/or CWA §404 permitting from the USACE for projects with the potential to discharge dredged or fill material into navigable waters of the United States.

158. This analysis anticipates 182 to 237 informal consultations and six to 12 formal consultations associated with agricultural activities during the next ten years. The administrative costs of consultations for agricultural activities will range from $730,000 to $1,280,000 ($650,000 to $1,020,000 for informal consultation, and $80,000 to $260,000 for formal consultation).[82] The range of administrative costs are based on an anticipation of a high level of effort for 20 percent of informal consultations where NRCS is the lead Action agency.[83]

- The Kentucky field office of the NRCS anticipates stream bank stabilization, shoreline protection, and stream crossing activities may result in section 7 consultation with the Service.[84] Consultations regarding stream bank stabilization and shoreline protections will result in 11 to 20 informal and three to six formal consultations in the next ten years and will be parsed by unit and area accordingly:

  - Unit 10 Buck Creek five to ten informal and one to two formal;
  - Unit 12 Marsh Creek three to five informal and one to two formal; and
  - Unit 11 Sinking Creek three to five informal and one to two formal.

  Consultations regarding stream crossing activities in Kentucky will result in 15 to 30 informal consultations and three to six formal consultations in the next ten years and will be parsed by unit and area accordingly:

  - Unit 10 Buck Creek five to ten informal and one to two formal;

November 16, 1995. Alabama Department of Environmental Management, Water Division, Water Quality Program, Administrative Code, §335-6-11. See Appendix B for a more in depth discussion of State water quality standards.

[82] Cost for the consultations for Area 1 French Broad River, Area 2 Holston River, and Area 3 Rockcastle River are less than reported in Exhibit 3-1. TVA anticipates their cost of consultation will be reduced to $500 because a past programmatic consultation in this watershed has streamlined the consultation process. TVA anticipates completing a new programmatic consultation for these areas within one year of designation of critical habitat reducing the total number of individual consultations as projects in years two through ten are covered by the programmatic consultation. This programmatic consultation is anticipated to cost $5,760 to $9,540, Service costs will range from $760 to $4,450 and TVA costs will be $5,000. All other consultation costs are calculated using the costs presented in Exhibit 3-1. Personal communication with Charles P. Nicholson, and Peggy W. Shute, Tennessee Valley Authority, May 2, 2003.

[83] Personal communication with Mason Howell, Kentucky Field Office, NRCS, February 25, 2003and March 3, 2003.

[84] Personal communication with Mason Howell, Kentucky Field Office, NRCS, February 25, 2003, March 3, 2003, May 22, 2003, May 23, 2003, and May 27, 2003.

- Unit 12 Marsh Creek five to ten informal and one to two formal; and
- Unit 11 Sinking Creek five to ten informal and one to two formal.

- Tennessee NRCS field offices anticipate section 7 consultations on stream bank stabilization, stream crossing, grade stabilization structure, and livestock watering access ramp activities will result in 83 to 103 informal consultations in the next ten years, and consultations by unit and area will be parsed as follows:[85]

  - Unit 3 Obed River 20 to 30 informal;
  - Unit 4 Powell River ten informal;
  - Unit 5 Clinch River 20 informal;
  - Unit 7 Beech Creek 20 to 30 informal; and
  - Unit 13 Laurel Fork ten informal;
  - Area 2 Holston River three informal.

- The Alabama and Mississippi field offices do not anticipate any projects which would require section 7 consultation with the Service on Unit 2 Bear Creek.[86]

- The Virginia NRCS field office anticipates up to five projects could require informal consultation with the Service over the next ten years; none on Unit 4 Powell River and up to five on Unit 5 Clinch River.[87]

- USACE and TVA anticipate 73 to 79 informal consultations on private bank stabilization projects not involving NRCS.[88] TVA and USACE anticipate coordinating on all projects with overlapping jurisdiction. Thus there will be 68 to 71 coordinated efforts and 5 to 8 uncoordinated efforts (USACE lead Action agency for one to two consultations, and TVA lead Action agency for four to six consultations). Appendix D provides detailed information on the breakdown of these consultations by unit and area.

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[85] Personal communication with Mike Zeaman, Tennessee Field Office, NRCS, February 21, 2003. Personal communication with James Ford, State Conservationist, Tennessee Field Office, NRCS, March 3, 2003, May 28, 2003.

[86] Personal communication with Tommy Counts, Alabama Field Office, NRCS, March 7, 2003. Personal communication with Homer L. Wilkes, State Conservationist, Mississippi Field Office, NRCS, March 21, 2003.

[87] Personal communication with John Myers, Biologist, Virginia Field Office, NRCS, May 21, 2003.

[88] Cost for the consultations for Area 1 French Broad River, Area 2 Holston River, and Area 3 Rockcastle River are less than reported in Exhibit 3-1. TVA anticipates their cost of consultation will be reduced to $500 because a past programmatic consultation in this watershed has streamlined the consultation process. TVA anticipates completing a new programmatic consultation for these areas within one year of designation of critical habitat reducing the total number of individual consultations as projects in years two through ten are covered by the programmatic consultation. This programmatic consultation is anticipated to cost $5,760 to $9,540, Service costs will range from $760 to $4,450 and TVA costs will be $5,000. All other consultation costs are calculated using the costs presented in Exhibit 3-1. Personal communication with Charles P. Nicholson, and Peggy W. Shute, Tennessee Valley Authority, May 2, 2003. Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10, 2003, March 12, 2003, and May 6, 2003.

Project Modifications

159. Project modifications likely to be recommended by the Service for agricultural activities, in addition to what is required by BMPs or State permitting authorities, include: working outside of the stream, no equipment in the stream, and use of natural materials (for example, use tree roots to deflect river momentum rather than rip rap).[89] While no cost estimates were provided for these project modifications, these costs are thought to be minimal.[90]

4.2.3 Activities in National Forests

160. Portions of the proposed critical habitat designation and areas essential to the conservation of the mussels (Unit 8 Rock Creek, Unit 11 Sinking Creek, Unit 12 Marsh Creek, and Area 3 Rockcastle River) are located near or within the southern districts of the Daniel Boone National Forest in eastern Kentucky.[91] The forest is managed for multiple uses, including recreation and conservation. Future activities which may affect the mussels can be categorized under five main functional areas, including recreation, timber, fire, wildlife, and land.[92] Recreational projects that may impact the mussels include campground maintenance, issuance of special use permits, and the construction and maintenance of horse, hiking, and mountain biking trails. Projects under the timber category consist of timber harvesting, thinnings, and reforestation. Fire projects include prescribed burnings and the control of wild fires. Installation of forest openings and wetland protection constitute the wildlife projects that may affect the mussels in the future. Finally, "land" refers to projects involving minerals, oil and gas, utilities (powerline access), and land acquisition and trading. In addition to these activities, revisions to the Forest Plan may also require a section 7 consultation.

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[89] Personal communication with Mason Howell, Kentucky Field Office, NRCS, February 25, 2003 and March 3, 2003. Personal communication with Mike Zeaman, Tennessee Field Office, NRCS, February 21, 2003. Personal communication with James Ford, State Conservationist, Tennessee Field Office, NRCS, March 3, 2003.

[90] Labor costs could increase, and material costs are not likely to increase. Personal communication with James Ford, State Conservationist, Tennessee Field Office, NRCS, March 3, 2003.

[91] Because Unit 10 Buck Creek lies within the forest's proclamation border, it could be acquired by the forest in the future. The possibility of this occurring over the next ten years will increase if this area is designated as critical habitat. Although portions of Unit 9 Big South Fork are located within the Daniel Boone National Forest, this area is under the jurisdiction of the Big South Fork National River and Recreation Area. Personal communication with Jim Bennett and David Taylor, US Forest Service, Daniel Boone National Forest, February 26, 2003.

[92] The Daniel Boone National Forest anticipates it will consult with the Service 1,000 times over the next ten years regarding all 32 threatened and endangered species that occur in the forest. About twenty percent of those consultations will be significantly attributable to the mussels. Personal communication with Jim Bennett and David Taylor, US Forest Service, Daniel Boone National Forest, February 25, 26, 2003.

Baseline

161. Activities in National Forests are subject to State and Federal water quality regulations, including the Clean Water Act and the Kentucky Water Quality Law. Baseline protections afforded the mussels regarding forest activities include sediment and pollution control measures.[93]

162. Portions of the Daniel Boone National Forest lie within the Big South Fork National River and Recreation Area. Therefore, baseline protections are provided in these areas under the National Wild and Scenic Rivers Act, Kentucky Wild Rivers Act, and Kentucky Outstanding National Resource Waters Act.[94]

163. The Proposed Revised Land and Resource Management Plan for the Daniel Boone National Forest may also provide some level of baseline protection for the mussels.[95] An assessment and strategy report for the Conservation of Aquatic Resources proposed such protections as the establishment of riparian prescription areas and streamside management zones, implementation of erosion control measures, and restrictions on the construction of stream crossings, skid trails, landings, roads, trails, firelines, and impoundments.[96]

Future Consultations

164. The typical Federal Action agency for activities within national forests is the Forest Service. This analysis forecasts 210 total consultations associated with forest service activities during the next ten years, 210 informal consultations or 200 informal consultations and ten formal consultations. A rough breakdown of informal consultations into functional area is:

- 30 percent recreation;
- 20 percent timber;
- 20 percent fire;
- 15 percent wildlife;
- 15 percent land projects; and
- ten total (high level) regarding amendments to the Forest Plan.

[93] For a more in depth description of these regulations, see Section 2.2.1 and Appendix B.

[94] For a more in depth description of these regulations, see Section 2.2.1 and Appendix B.

[95] U.S. Forest Service. Proposed Revised Land Resource Management Plan for the Daniel Boone National Forest. April 2003.

[96] An Assessment and Strategy for Conservation of Aquatic Resources of the Daniel Boone National Forest, Interim Report, April 2001. (Document related to Daniel Boone Plan Revision.)

The formal consultations may involve wildlife, recreation, or land projects.[97] The Forest Service anticipates either 110 informal consultations, or 100 informal consultations and ten formal consultations will be distributed between Unit 8 Rock Creek, Unit 11 Sinking Creek, and Unit 12 Marsh Creek. The remaining 100 informal consultations will be on Area 3 Rockcastle River. The administrative cost of consultations for national forest activities will range from $1,030,000 to $3,580,000 ($1,030,000 to $3,340,000 for informal consultation, and $0 to $240,000 for formal consultation).[98]

Project Modifications

165. Uncertainty exists as to whether the Service will recommend any project modifications as a result of these consultations. In following the Forest Plan, the Forest Service strives to mitigate effects on threatened and endangered species.[99]

4.2.4 Silviculture

166. Private forestry is also a common land use in the areas surrounding the proposed critical habitat designation. Potential forestry activities which can adversely affect the mussels include timber harvesting near streams and timber harvesting such as the construction of stream crossings, skid trails, and landings.

Baseline

167. Kentucky and Tennessee State agriculture department BMPs provide baseline protections to the mussels, including the establishment and implementation of streamside management zones, erosion control measures, and practices for stream crossings and road and skid trail construction.[100] In Kentucky, the implementation of BMPs is required under the Kentucky Forest Conservation Act.[101] Forestry activities which impact wetlands also require a CWA Section 404 permit from the USACE. In order to obtain exemption from a Section 404 permit, mechanical site preparation activities must also be conducted in accordance with USACE's BMPs, which minimize soil disturbance from forestry

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[97] Personal communication with Jim Bennett and David Taylor, US Forest Service, Daniel Boone National Forest, February 26, 2003.

[98] See Exhibit 3-1.

[99] Personal communication with Jim Bennett and David Taylor, US Forest Service, Daniel Boone National Forest, February 26, 2003.

[100] Cooperative Extension Service, University of Kentucky. *Field Guide to Best Management Practices for Timber Harvesting in Kentucky.* (Also includes *Kentucky Forest Practice Guidelines for Water Quality Management* and excerpts from the *Kentucky Agriculture Water Quality Authority Producer Workbook*.). Tennessee Division of Forestry. 1993. *Guide to Forestry Best Management Practices in Tennessee.*

[101] See Appendix B for a more detailed description of the Kentucky Forest Conservation Act

activities.[102]

168. In addition to BMPs, NRCS Tennessee Conservation Practice Standards, specifically the Riparian Forest Buffer, Streambank and Shoreline Protection, and Wetland Wildlife Habitat Managment Standards, also provide a baseline level of protection to the mussels.[103] Finally, the mussels are afforded protection under Federal and State water quality standards, such as the CWA and floodplain regulations that address logging debris.[104]

169. Other programs in Kentucky and Tennessee that benefit the mussels are Master Logger programs, which offer logger certification and continuing education courses on timber harvesting and BMPs, and Forest Stewardship Programs, which provide management planning assistance to landowners who are interested in conserving and protecting their forested lands. Stewardship Plans are tailored to meet the primary objectives of the landowner in such areas as wildlife, aesthetics, recreation, and forestry.[105]

Future Consultations

170. The typical Federal nexus for forestry activities is CWA §404 permitting from the USACE for projects with the potential to discharge dredged or fill material into navigable waters of the United States. This analysis does not foresee the issuance of 404 permits for projects relating to forestry over the next ten years. Therefore, no informal or formal consultations associated with forestry are expected.[106]

4.2.5 National Parks, Wild and Scenic Rivers, and National River and Recreation Areas

Obed Wild and Scenic River

171. Portions of the Obed Wild and Scenic River lie within the proposed critical habitat designation for the mussels. The park, which includes portions of the Obed River, Clear Creek, Daddys Creek and the Emory River, is located in Morgan and Cumberland Counties in Tennessee. The NPS allows public access for such recreational activities as whitewater

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[102] U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. *Memorandum to the Field, Regarding Application of Best Management Practices,* November 28, 1995.

[103] NRCS, Kentucky Field Office, Tennessee Field Office. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Forest Stand Improvement.
NRCS, Kentucky Field Office, Tennessee Field Office, Alabama Field Office. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Wetland Wildlife Habitat Management.

[104] Debris in Floodplains, KRS 151.250 (in Field Guide to BMPs for Timber Harvesting in Kentucky).

[105] Personal communication with David Arnold, Tennessee Division of Forestry, February 28, 2003, and Tim Sheehan, Kentucky Division of Forestry, March 4, 2003.

[106] Personal communication with William James, Army Corps of Engineers, March 10, 2003.

boating, rock climbing, hiking, and fishing. Activities that occur in the park which may adversely impact the mussels are the construction of bridges, roads, and impoundments, and mineral productions. However, the NPS would only be the lead Action agency and consult with the Service for some activities, such as bridge crossing, river crossing, general park management plans, and trail maintenance. For discussions of other activities occurring within the parks where NPS would not be the lead Action agency (i.e., mineral production, and bridge crossings) please refer to each activities respective section.[107]

Big South Fork National River and Recreation Area

172. Portions of the Big South Fork National River and Recreation Area also lie within the proposed critical habitat designation for the mussels. Located in the Big South Fork region of the Cumberland River, the park is operated and managed by the NPS, and is open to the public. Recreational activities in the park include camping, whitewater rafting, kayaking, canoeing, hiking, horseback riding, mountain biking, hunting, and fishing. Future activities within the park that may impact the mussels include river crossing and trail maintenance projects, and the development of management and remedy plans, such as those associated with the General Management Plan, contaminated mine damage sites, and privately owned oil and gas wells.[108]

Baseline

173. Under the Wild and Scenic Rivers Act and the Water Resources Act of 1974 (Public Law 93-251), activities within the Obed and Big South Fork parks are limited; thus, these Acts provide some level of protection for the mussels.[109] For example, river access and recreational use are restricted to particular points along the river.[110] The mussels are also afforded protection under Federal and State water quality standards.[111]

Future Consultations

Obed Wild and Scenic River

174. The typical Federal Action agency for activities within the Obed Wild and Scenic Rivers Area is the NPS. During the next ten years, the NPS anticipates one low level

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[107] For a complete discussion on these types of activities, see Section 4.1.1 for Road/Bridge Construction and Section 4.1.8 for Oil and Gas Drilling.

[108] Personal communication with Chris Stubbs and Tom Blount, National Park Service, Big South Fork River and Recreation Area, March 3, 2003.

[109] For a more detailed description of these protections, see Section 2.

[110] Personal communication with Chris Stubbs and Tom Blount, National Park Service, Big South Fork River and Recreation Area, March 3, 2003. The Big South Fork General Management Plan may also provide a baseline level of protection for the mussels.

[111] For a more detailed description of these standards and regulations, see Section 2 and Appendix B.

informal consultation regarding a small bridge construction in Unit 3 Obed River.[112]

Big South Fork National River and Recreation Area

175. The NPS anticipates a total of seven informal consultations and one formal consultation regarding activities within the park over the next ten years. These consultations include one formal consultation regarding a river crossing project, two informal consultations associated with revisions to the park's General Management Plan and five informal consultations related to trail maintenance projects over the next ten years.[113]

176. This analysis anticipates eight informal consultations and one formal consultation associated with national park activities during the next ten years. The administrative costs of consultations for national park activities will range from $34,000 to $120,000 ($20,000 to $98,000 for informal consultation, and $14,000 to $22,000 for formal consultation).[114]

Project Modifications

Obed Wild and Scenic Rivers

177. The NPS is likely to incorporate any necessary project modifications, as the mission of NPS is to protect the park's natural resources and wildlife habitat.[115] Thus, no project modifications are expected to result from the bridge crossing consultation.

Big South Fork National River and Recreation Area

178. The river crossing project may lead to such project modifications as temporary mussel relocation in order to minimize disturbance to the mussels, or termination of the project all together.[116]

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[112] The Tennessee District of the Federal Highway Administration is currently developing two bridge projects in Unit 3 Obed River. These consultations are captured in Section 4.2.1, TDOTs estimates for Unit 3 Obed River.

Personal communication with Kristen Stoehr, National Park Service, Obed Wild and Scenic River, March 4, 2003.

[113] Personal communication with Chris Stubbs and Tom Blount, National Park Service, Big South Fork River and Recreation Area, March 3, 2003.

[114] See Exhibit 3-1.

[115] Personal communication with Kristen Stoehr, National Park Service, Obed Wild and Scenic River, March 4, 2003. Other projects in or near the park that could impact the mussels include mining, oil drilling, and the construction of impoundments, reservoirs, and dams. However, because the NPS is not the lead agency, the NPS will not consult with the Service regarding these projects. For a complete discussion on these types of activities, see Sections 4.1.1 and 4.1.8.

[116] Personal communication with Chris Stubbs and Tom Blount, National Park Service, Big South Fork River and Recreation Area, March 3, 2003.

4.2.6 Coal Mining

179. Coal mining is projected to occur on private and public land in Kentucky, Virginia and Tennessee. The proposed critical habitat units and areas essential to the conservation of the mussels potentially impacted by coal operations include the Unit 3 Obed River, Unit 9 Big South Fork, Unit 13 Laurel Fork, Unit 11 Sinking Creek, Unit 8 Rock Creek, Unit 5 Clinch River, and Area 3 Rockcastle River.

180. All coal mines require a surface coal mining permit issued under authority of the Federal Surface Mining Control and Reclamation Act (SMCRA). Under SMCRA, States are given the primary (but not exclusive) responsibility for regulating surface coal mining and reclamation operations if they develop, and the OSM approves, a program which demonstrates the State's capability to carry out the applicable provisions of SMCRA, including rules and regulations consistent with SMCRA (OSM retains oversight responsibility).[117] The OSM has granted the States of Kentucky (through the DSMRE) and Virginia (through the DMLR) the regulatory authority ("primacy") to issue surface coal mining permits. Because Kentucky and Virginia have regulatory authority, there is no nexus and no section 7 consultation. The State of Tennessee does not have primacy, and OSM issues all surface mining permits in this State. The OSM issued permit is the nexus for a section 7 consultation with the Service.[118]

Baseline

181. The State of Tennessee does not have regulatory primacy for surface coal mining; instead OSM is responsible for regulating surface coal mining. As a Federal agency, OSM adheres to SMCRA.[119] State water quality standards also provide some baseline protection; the Tennessee Water Quality Control Board requires permit applicants to evaluate practicable alternatives and conduct avoidance, minimization, and/or mitigation for activities impacting

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[117] Memorandum dated September 24, 1996, from Assistant Director, Ecological Services, to Acting Director, Office of Surface Mining Reclamation and Enforcement, re. "Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977."

To be delegated primacy, State surface mining laws and regulations must be as effective and no less stringent than Federal surface mining laws and regulations. Personal communication with Robert Penn, Director, Office of Surface Mining, Big Stone Gap Field Office, Big Stone Gap, Virginia, February 25, 2003. Personal communication with Joseph Blackburn, Program Manager, Office of Surface Mining, Lexington Field Office, Lexington, KY, February 25, 2003. Personal communication with Doug Siddell, Office of Surface Mining, Knoxville, Tennessee, February 26, 2003.

[118] Personal communication with Doug Siddell, Office of Surface Mining, Knoxville, Tennessee, February 26, 2003. Personal communication with Les Vincent, Customer Services Unit Manager, Department of Mines, Minerals & Energy, Division of Mined Land Reclamation, Big Stone Gap Field Office, Big Stone Gap, Virginia, February 28, 2003. Personal communication with Dr. Richard J. Wahrer, Environmental Scientist, Kentucky Department for Surface Mining Reclamation and Enforcement, Frankfort, KY, March 6, 2003. Personal communication with USFWS Field Office Biologist, Cookeville, Tennessee, March 6, 2003.

[119] A more complete discussion of the protections provided through SMCRA can be found in Section 2.2.2.

water.[120] Unit 3 Obed River is also part of the Obed Wild and Scenic River, which is a National Park managed by the NPS.[121]

182. The Virginia Coal Surface Mining Control and Reclamation Act of 1979 provides for some protections to the mussels.[122] The Act requires that a protection and enhancement plan accompany each surface mining application. As part of the Plan the applicant describes how, to the extent possible using the best available technology, disturbances and adverse impacts on fish and wildlife and related environmental values will be minimized during the operation.[123] Protective measures may include the establishment of buffer zones, restrictions on the location and design of roads and powerlines, and surface water quality monitoring. Sediment control measures are also required.[124] The Virginia State Water Control Law also provides for some protection of the mussels by prescribing numeric limits for specific physical, chemical, biological, and radiological characteristics of water.[125]

183. The Kentucky Surface Mining Law[126] and the Permanent Program Regulations for Surface Coal Mining Reclamation Operations and Coal Exploration Operations[127] provide for some protection to the mussels. A Mining and Reclamation Plan (MRP) is required with each surface mining permit application. The MRPs include sections on topsoil handling, backfill and grading, surface water control and monitoring, ground water control and monitoring, and revegetation. Mining activities which require Kentucky pollution discharge elimination system permits (KPDES) are also required to implement BMPs.[128] A KPDES is required for discharges into waters of the Commonwealth. In addition, the Kentucky Water Quality Law provides for some protection of the mussels by prescribing numeric limits for specific physical, chemical, biological, and radiological characteristics of water.[129]

Future Consultations

184. As stated above all mines require a surface coal mining permit issued under the

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[120] Tennessee. Code Ann., §69-3-101.

[121] See Section 2.2.2 for a discussion of the protections provided.

[122] Virginia Code Ann, §45.1-226. (1979).

[123] Virginia Code Ann, 4§25-130-780.16.

[124] Virginia Code Ann, 4§25-130-816.45.

[125] Virginia Code Ann, §62.1-44.15(3a).

[126] Kentucky Revised Statutes, 350.

[127] Kentucky Administrative Regulations, §405.7-24.

[128] Natural Resources and Environmental Protection Cabinet. 1995. Best Management Practices For Surface Coal Mining. Division of Water, Water Quality Branch, Nonpoint Source Section.

[129] Kentucky Revised Statutes §401.5:031.

authority of SMCRA. OSM has granted primacy to Kentucky and Virginia but reserves regulatory authority for Tennessee.

185. This analysis anticipates 11 to 24 informal consultations and 302 to 320 TA efforts associated with coal mining and coal mine reclamation during the next ten years. The administrative costs of consultations for coal activities will range from $210,000 to $560,000 ($30,000 to $80,000 for informal consultation, and $180,000 to $480,000 for TA).

Tennessee

186. Although there is not much coal mining activity in Tennessee, approximately six surface coal mining permits are processed in the State annually. OSM has only consulted with the Service on surface coal mining permits three times since 1984, all three consultations were informal, and all three required that OSM prepare a BA.[130]

187. In Tennessee, coal fields drain into two of the proposed critical habitat units, Unit 3 Obed River and Unit 9 Big South Fork River.[131] During the next ten years, OSM anticipates it will process 60 coal permits in the State. Up to three of these permits will occur in Unit 3 Obed River Unit, and 10 to 20 will occur in Unit 9 Big South Fork Unit. The consultations with the Service on these permits will be informal, and up to two of the informal consultations will require that OSM prepare a BA.[132]

188. There are no active coal mines located within the boundaries of the Big South Fork National River and Recreation Area or the Obed Wild and Scenic River area. There are, however, more than 100 abandoned coal mine openings located inside the Big South Fork National Park, and the NPS has begun efforts to address the contaminated sites. Remediation plans for nine of the most acidic sites will be packaged together into a single EIS and consulted on with the Service. Remediation activities will also require a section 404 CWA permit from USACE. The NPS will coordinate and combine the two potential consultations into a single consultation. The consultation will occur in 2004, it will be informal, and it will not involve a BA or project modifications. The NPS estimates there will be no further coal

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[130] Personal communication with Doug Siddell, Office of Surface Mining, Knoxville, Tennessee, February 26, 2003.

The Cookeville field office queried their consultation database back to October 1, 1997. Since this time, there have been no consultations regarding the mussels in Tennessee. However, there were two mine projects that involved spotfin chub consultations. Both of these operations were located in the Obed River watershed, a watershed that contains designated habitat for the mussels. Personal communication with Biologist, U.S. Fish and Wildlife Service, Cookeville, Tennessee, May 21, 2003.

[131] The Obed River Unit lies within the section of the Obed River designated as a Federal Wild and Scenic River. The NPS does not consult with the Service on surface coal mining or oil and gas drilling permits, the consultation is left to the lead regulatory agency (OSM and USACE). Personal communication with Kristin A. Stoehr, Unit Manager, Obed Wild and Scenic River, Wartburg, Tennessee, March 4, 2003.

[132] The low range estimate reflects the current coal market and the high range estimate reflects an improved coal market. Personal communication with Doug Siddell, Office of Surface Mining, Knoxville, Tennessee, February 26, 2003.

mine activities during the next 10 years.[133]

Virginia[134]

189. In Virginia, coal fields impact Unit 5 Clinch River. In the future, DMLR anticipates it will process 250 to 400 surface coal mining permits in the State annually (150 to 200 new permits or permit revisions and 100 to 200 permit renewals).[135] Of these annual permits, 30 will occur in Unit 5 Clinch River (4 new permits, 20 permit renewals, and 6 permit revisions). Unit 4 Powell River is downstream of the coal mining areas and does not encompass any coal mine operations.[136] The DMLR anticipates the 300 Unit 5 Clinch River permits will require technical assistance efforts with the Service.[137]

Kentucky

190. Currently in Kentucky, fewer than five surface coal mining permits address the mussels.[138] While some coal mining occurs within five miles of the proposed critical habitat units, any coal mining in the area occurs upstream, and the mines do not drain into the proposed critical habitat units. During the next 10 years, DSMRE estimates it will process two to 20 new permits or permit revisions in or nearby the proposed critical habitat units. Of

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[133] Personal communication with Tom Blount, Chief of Resource Management, National Park Service, Big South Fork National River & Recreation Area, Oneida, Tennessee, March 4, 2003. Personal communication with Kristin A. Stoehr, Unit Manager, Obed Wild and Scenic River, Wartburg, Tennessee, March 4, 2003.

[134] This analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Black-water events could impact the mussels. For example, in 1996, a slurry impoundment owned by Lone Mountain Coal Company failed, releasing 6 million gallons of coal slurry to the Powell River. The spill impacted more than 65 miles of stream, much of which extended into the main stem of the Powell River down to the Virginia/Tennessee boarder. The number, frequency, and magnitude of black-water events are not "reasonably foreseeable," and are not considered in this analysis.

[135] The consultation history provided by the Southwestern Virginia Field Office indicates there is a full-time biologist that works primarily with coal mining issues in accordance with the 1996 National Programmatic Consultation on surface coal mining and that the field office is in the process of developing species specific measures for industry regulators. The history did not include any consultations in addition to the 1996 National Programmatic Consultation on surface coal mining. Written communication from the Southwestern Virginia Field Office, February 20, 2003.

[136] Compared to the Clinch River watershed, more coalfield activities occur in the Powell River watershed. However, the activity occurs upstream from the unit. While the larger number of coal operations could have a compounding and cumulative on the mussels in the Powell River, cumulative effects are not addressed in consultations with the Service.

[137] Personal communication with Les Vincent, Customer Services Unit Manager, Department of Mines, Minerals & Energy, Division of Mined Land Reclamation, Big Stone Gap Field Office, Big Stone Gap, Virginia, March 4, 2003.

[138] The Cookeville field office queried their consultation database back to October 1, 1997. Since this time, the Service conducted consultations regarding endangered mussels for two mining projects. Personal communication with Biologist, U.S. Fish and Wildlife Service, Cookeville, Tennessee, May 21, 2003.

these permits, up to six will occur in each of the following: Unit 13 Laurel Fork, Unit 11 Sinking Creek, and Unit 8 Rock Creek, and two will occur in Area 3 Rockcastle River. These will be technical assistance efforts for the Service.[139]

Project Modifications

191. In Tennessee, the existing Federal (section 404 CWA permit) and State (NPDES permit, Tennessee Aquatic Resource Alteration Permit (ARAP), and water quality/401 certification) permits/certifications requirement will adequately protect the mussels and their habitat.[140] However, 10 percent (one or two) of the informal consultations may require project modifications to address Service concerns pertaining to sediment control and water quality.[141] Recommended project modifications may include the installation of additional sumps along haul roads to handle sediment loads, the construction of larger sediment basins (holding ponds), more frequent clean-out of ponds and haul road sumps, construction of treatment ponds, ongoing removal of precipitates and heavy metals, monitoring, and potentially construction of treatment facilities. Installation of sumps, the construction of larger sediment basins (holding ponds), and clean-out of ponds and haul road sumps are performed with a backhoe, and the cost depends on the length of haul road and the size of the holding pond. This additional cost is not expected to be expensive because it only involves a backhoe.[142]

4.2.7 Gravel Dredging and Excavation

192. The proposed mussel critical habitat units potentially impacted by gravel dredging and excavation include Unit 1 Duck River, Unit 10 Buck Creek, and Area 1 French Broad River. Gravel dredging and excavating activities do not require a section 404 CWA permit from the USACE. The section 404 process only applies when there will be a discharge of dredge materials. Gravel dredging and excavation does, however, require State permitting (e.g., Tennessee requires an ARAP) and State water quality/401 certification. While there is no Federal nexus for State permitting and water quality certification, Unit 1 Duck River, Unit 10 Buck Creek, and Area 1 French Broad River are designated as section 10 waters, and

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[139] Personal communication with Dr. Richard J. Wahrer, Environmental Scientist, Kentucky Department for Surface Mining Reclamation and Enforcement, Frankfort, KY, March 4, 2003, March 6, 2003, and April 29, 2003.

[140] "...it is the Service's biological opinion that surface coal mining and reclamation operations conducted in accordance with properly implemented Federal and State regulatory programs under SMCRA are not likely to jeopardize the continued existence of listed or proposed species, and are not likely to result in the destruction or adverse modification of designated or proposed critical habitats." Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977

[141] Personal Communication with Tom Blount, Chief of Resource Management, Big South Fork National River and Recreation Area, April 8, 2003. Personal communication with Doug Siddell, Office of Surface Mining, Knoxville, Tennessee, March 5, 2003.

[142] Personal communication with Doug Siddell, Office of Surface Mining, Knoxville, Tennessee, March 5, 2003.

therefore dredging and excavation activities require a section 10 permit from the USACE.[143] A Federal nexus does exist for this section 10 permit, and USACE will initiate section 7 consultation with the Service.

193. On February 10, 1998, the Department of Army issued a regional permit for sand and gravel excavation in Tennessee, Kentucky and Alabama. This regional permit authorizes excavation activities under section 10 of the Rivers and Harbors Act of 1899 provided work is accomplished in accordance with the terms and conditions of the permit.[144] This regional permit expired on February 10, 2003 and the USACE is not certain whether it will be renewed in the future. However, even if the regional permit is renewed, if a listed species is present in the gravel dredging and excavation area, the USACE would likely require an individual section 10 permit, triggering consultation with the Service. Therefore, the estimate of future consultations with the Service for gravel and dredging activities is not dependent on the renewal decision for the regional permit.[145]

Baseline

194. Unit 1 Duck River, Unit 10 Buck Creek, and Area 1 French Broad River are designated as section 10 waters of the Rivers and Harbors Act of 1989. The required section 10 sand and gravel excavation permit requirements provide baseline protections to the mussels. Some of the special conditions contained in the permit limit the dredging activity as follows: (1) no destruction of a threatened or endangered species or the critical habitat of such species; (2) work restricted to outside the stream flow, "in the dry," and during low flow conditions from July 15 through October 31; (3) maintenance of a mandatory buffer zone between the excavation site and the stream flow; (4) streamside vegetation must be left undisturbed and intact; and (5) site access is limited to the existing road network.[146] The Tennessee ARAP provides another layer of baseline protection for the mussels in Unit 1 Duck River because the general permit prohibits dredging in State Scenic Rivers and dredging activities that adversely affect a State or Federally listed threatened or endangered species.[147] State water quality permits also provide a level of baseline protection for the mussels in Unit 1 Duck River, Unit 10 Buck Creek, and Area 1 French Broad River.

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[143] Section 10 of the Rivers and Harbors Act of 1899 provides for the protection of navigable waters. This Act controls the dredging and filling of all US waterways and makes it unlawful to construct any structure in or over these waters without authorization from the USACE. Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003.

[144] A special condition in the permit prohibits the destruction of a threatened or endangered species or the critical habitat of such species. Special conditions also restrict when , where, and how dredging and excavating activities can be done. Department of the Army Regional Permit 97-RP-2, 3, 4.

[145] Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003.

[146] Department of the Army Regional Permit 97-RP-2, 3, 4

[147] Even if the gravel dredging activity could occur, the activity would have to comply with other Federal and State laws, and would be limited by terms and conditions similar to those in the Federal section 10 permit. Tennessee Department of Environmental Conservation, Aquatic Resource Alteration Permit.

Future Consultations

195. The USACE issues permits under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act for private activities that occur in water bodies or involve modifying navigable waterways for construction and maintenance of structures.[148] The USACE issues permits under section 404 of the Clean Water Act for all proposed units but only Unit 1 Duck River, Unit 10 Buck Creek, and Area 1 French Broad River fall under section 10 of the Rivers and Harbors Act.

196. USACE section 10 permits constitute the primary Federal nexus for consultation regarding gravel dredging. This analysis anticipates seven to 16 consultation efforts associated with gravel dredging and excavation activities during the next ten years (two to five informal consultations for Unit 1 Duck River, five to ten formal consultations for Unit 10 Buck Creek, and up to one formal consultation on Area 1 French Broad River).[149] The administrative cost of consultations for gravel dredging and excavation activities will range from $80,000 to $310,000 ($10,000 to $70,000 for informal consultations and $70,000 to $240,000 for formal consultations).

Project Modifications

197. Because Service recommendations on permits for gravel dredging in small streams generally mirror the terms and conditions outlined in the Department of the Army Regional Permit, there are no anticipated project modifications above what is already considered baseline (the regional or individual USACE permit).

4.2.8 Oil and Gas Development

198. Most of the oil and gas activity that may impact the proposed critical habitat units is likely to occur in Fentress, Morgan, and Scott Counties in Tennessee, and McCreary County in Kentucky.[150] Therefore, the proposed mussel critical habitat units most likely impacted by future oil and gas drilling operations include Unit 3 Obed River and Unit 9 Big South

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[148] USACE issues four types of permits: (1) individual permit, a type of standard permit requiring public comment; (2) letter of permission (LOP), a type of standard permit requiring coordination with adjacent property owners; (3) nationwide permits, which authorize a category of activities and are issued for individual small projects across the Unites States; and (4) regional or general permits, which authorize a category of activities in a specific region.

[149] Because of current gravel dredging practices, consultation for gravel dredging operations in Unit 10 Buck Creek may result in formal consultation with the Service. Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003.

[150] Personal Communication with Tom Blount, Chief of Resource Management, Big South Fork National River and Recreation Area, April 8, 2003. Personal communication with Michael Burton, Geologist, Tennessee Department of Environmental Conservation, Division of Geology, Nashville, Tennessee, March 5, 2003.

Fork.[151] The five miles of proposed critical habitat on Unit 13 Laurel Fork is not likely to see oil and gas activity during the next ten years.[152]

Baseline

199. Federal and State oil and gas laws and regulations provide some baseline protection to the mussels. While the Federal regulations do specify Operating Standards (e.g., surface operations shall not be conducted within 500 feet of a stream bank) that apply to drilling operations within a National Park, no parts of the regulations specifically mention special conditions that protect threatened or endangered species.[153] The NPS is also directed to not approve a plan of operations "...where operations would substantially interfere with management of the unit to ensure the preservation of its natural and ecological integrity in perpetuity, or would significantly injure the federally-owned or controlled lands or waters."[154]

200. State regulations also do not mention specific conditions that protect threatened or endangered species. However, the State regulations do require that oil and gas operations be conducted in a manner that prevents or mitigates adverse environmental impacts, such as soil erosion and water pollution, and prohibits discharges without a valid NPDES permit from TDEC.[155] While the baseline level of protection is not clear, the State oil and gas regulation may provide some baseline level of protection to the mussels.

Future Consultations

201. Oil and gas drilling is permitted by the States of Tennessee and Kentucky. In Tennessee, permits are issued by TDG, Oil and Gas Section, and in Kentucky, permits are issued by the DOG. Because these States have regulatory authority, there is no nexus to require section 7 consultation.[156] However, some subsurface minerals located below the Obed Wild and Scenic River area and Big South Fork National River and Recreation Area (both National Parks) are privately owned.[157] To access this resource (i.e., for oil and gas activity

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[151] Personal communication with U.S. Fish and Wildlife Service staff, Tennessee, Alabama, Mississippi, Kentucky, and Virginia Field Offices, January 28, 2003.

[152] Personal communication with Michael Burton, Geologist, Tennessee Department of Environmental Conservation, Division of Geology, Nashville, Tennessee, March 5, 2003.

[153] 30 CFR 9 Subpart B, Non-Federal Oil and Gas Rights, § 9.41 (a).

[154] 30 CFR 9 Subpart B, Non-Federal Oil and Gas Rights, § 9.37 (a)(3).

[155] Rules of Tennessee State Oil and Gas Board Statewide Order No. 2 Terms, 1040-2-2-.02 (Drilling Permits), 1040-2-6-.04 (Environmental Protection), and 1040-3-3-.02 (2)(g) (Pollution and Safety Controls).

[156] Personal communication with Etta Spradlin, Biological Science Technician, National Park Service, Big South Fork National River & Recreation Area, Oneida, Tennessee, March 4, 2003.

[157] In the Big South Fork National River and Recreation Area, approximately 20,000 acres (the total National Park is approximately 115,000 acres) of subsurface minerals are owned privately. Personal communication with Tom Blount, Chief of Resource Management, National Park Service, Big South Fork National River &

occurring on, over, or through National Park land), NPS must initiate the NEPA process and approve a plan of operations. The NPS approved plan of operations is the nexus for a section 7 consultation with the Service.[158]

202. There are 326 oil and gas wells located within the legislative boundary of the Big South Fork National River and Recreation Area. Approximately 150 of these wells are currently under active lease. While no plans of operation are in effect now, the NPS anticipates it will process 35 to 50 plans during the next ten years (25 to 30 for existing wells and 10 to 20 for new wells). Because oil and gas activity usually occurs on plateaus the consultations with the Service on these plans will be informal. The plans require NPS to prepare an environmental assessment, including a BA. No project modifications are anticipated.[159] The administrative costs of informal consultations for oil and gas activities within Unit 9 Big South Fork will range from $480,000 to $680,000 over the next ten years.

203. The NPS anticipates no oil and gas activities inside Unit 3 Obed River (which is within the park). There are six oil and gas wells located within the National Park boundaries, and none of the wells are in operation. Although there may be new oil and gas well activity near the park boundaries it is not likely to occur inside the park.[160]

4.2.9 Dams/Reservoirs

204. Seven TVA non-power-generating dams are currently operating adjacent to the proposed critical habitat (Normandy Reservoir on Unit 1 Duck River and Bear Creek Reservoirs on Unit 2 Bear Creek tributaries).[161] These dams are managed for flood control, water supply, and recreation. There are two hydroelectric dams in or affecting the areas essential to the conservation of the mussels (Douglas Dam on Area 1 French Broad River, and Cherokee Dam on Area 2 Holston River). Douglas Dam's four hydroelectric units have a generating capacity of 145,800 kilowatts, while Cherokee Dam's four hydroelectric units have a generating capacity of 135,200 kilowatts.[162] The activities with Federal nexuses for dams and reservoirs in the Tennessee Valley are TVA projects, 26(a) permitting from the TVA, and/or CWA §404 permitting from the USACE. Potential activities that can adversely

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Recreation Area, Oneida, Tennessee, March 4, 2003.

[158] Personal communication with Tom Blount, Chief of Resource Management, National Park Service, Big South Fork National River & Recreation Area, Oneida, Tennessee, March 4, 2003.

[159] Personal communication with Tom Blount, Chief of Resource Management, National Park Service, Big South Fork National River & Recreation Area, Oneida, Tennessee, March 4, 2003.

[160] Personal communication with Etta Spradlin, Biological Science Technician, National Park Service, Big South Fork National River & Recreation Area, Oneida, Tennessee, March 4, 2003.

[161] Personal communication with Charles P. Nicholson, John J. Jenkinson, John T. Baxter, and Peggy W. Shute, Tennessee Valley Authority, March 20, 2003.

[162] Tennessee Valley Authority. TVA Reservoirs and Power Plants. http://www.tva.gov/sites/sites_ie2.htm, as viewed on May 23, 2003.

affect the mussels include: replacement and maintenance activities, construction of new facilities, flow alterations, and pool level changes.

Baseline

205. TVA policy and principles on the environment provide the mussels a level of base line protection by requiring the minimization of effects of operations on the environment, and compliance with environmental laws and regulations.[163] State water quality standards also provide some baseline protection; for example the Tennessee Water Control Board requires permit applicants to evaluate practicable alternatives and conduct avoidance, minimization, and/or mitigation for activities impacting water.[164]

Future Consultations

206. No new hydroelectric dams or water supply reservoirs are anticipated for any of the critical habitat units or areas essential to the conservation of the mussels.[165] Although water supply related-projects in the upper Duck River Basin have been identified and evaluated, water supply facility construction is unlikely in Unit 1 Duck River .[166] While the potential for enhancement projects associated with the Bear Creek Reservoirs exists, these projects are in the early discussion phase and the future likelihood of such projects is unclear. Although there was a consultation a few years ago on modernizing turbines for Douglas Dam, this is unlikely to be an issue in the future.[167] Thus, this analysis anticipates no consultations associated with dams and reservoirs during the next ten years.[168]

4.2.10 Power Plants

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[163] TVA. Principles and Practices Manuel. Revised 2002. http://www.tva.com/foia/readroom/policy/prinprac/index.htm, as viewed on February 19, 2003.

[164] Tennessee. Code Ann., §69-3-101.

[165] Charles Nicholson, Tennessee Valley Authority, Environmental Policy and Planning, January 30, 2003.The Fountain Creek Reservoir, one of the four proposed alternatives evaluated by TVA in their Final Programmatic Environmental Impact Statement (FPEIS) Future Water Supply Needs in the Upper Duck River Basin (2000), if constructed could adversely affect the mussels. A revised water demand model forecasts water demands in the area will be met for the next 50 years. Current focus is on water quality issues associated with the Normandy Reservoir. Personal communication with Larry Murdock, Executive Director, Tennessee Duck River Development Agency, February 24, 2003. Personal communication with Charles P. Nicholson, John J. Jenkinson, John T. Baxter, and Peggy W. Shute, Tennessee Valley Authority, March 20, 2003.

[166] Personal communication with Charles P. Nicholson, John J. Jenkinson, John T. Baxter, and Peggy W. Shute, Tennessee Valley Authority, March 20, 2003.

[167] Personal communication with Charles P. Nicholson and Peggy W. Shute, Tennessee Valley Authority, May 2, 2003.

[168] TVA is currently consulting with the Service on all dam operations in the entire Tennessee River watershed. This analysis anticipates this consultation will be completed in the near future. Thus, this consultation is part of the baseline.

207. One power plant is currently located adjacent to critical habitat and withdraws water for day to day operations.[169] The Carbo power plant on Unit 5 Clinch River is a coal fired power plant that withdraws water to replace loss from evaporation. At least one power plant is proposed adjacent to critical habitat, in Unit 1 Duck River.[170] Potential power plant activities that can adversely affect the mussels include: construction or improvement of facilities, construction or improvement of access roads, changes in water withdrawals, and accidental discharges.

Baseline

208. State water quality standards provide some baseline protection; for example, the Virginia State Water Control Law prescribes numeric limits for specific physical, chemical, biological, and radiological characteristics of water.[171] A Tennessee executive order, issued by the governor, limits the development of power plants. This order also stipulates water withdrawals for new power plants are not allowed to affect existing users, harm endangered species, or impair water quality.[172]

Future Consultations

209. The typical Federal nexus for power plants is CWA §404 permitting from the USACE for projects with the potential to discharge dredged or fill material into navigable waters of the United States, such as construction or maintenance of water intake structures. Permits to limit the materials that enter waters, stormwater, and water withdrawal permits are issued by the States and would not establish a Federal nexus. Power plants, other than hydroelectric, are licensed by the State, thus no Federal nexus is established.[173] This analysis anticipates no consultations associated with power plants during the next ten years.[174]

4.2.11 Utilities Construction and Maintenance

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[169] Personal communication with U.S. Fish and Wildlife Service staff, Tennessee, Alabama, Mississippi, Kentucky, and Virginia Field Offices, January 28, 2003.

[170] Maury Energy Projects, LLC is proposing a natural gas fueled electric generating plant in Maury County Tennessee. This project could draw five to eight million gallons of water per day from the Duck River. Maury Energy Projects, LLC. Proposed Rieves Bend Road Power Plant - A Summary. From http://www.cme-energy.com/projects/maury/project_summary.asp as viewed on February 19, 2003.

[171] Virginia Code Ann, §62.1-44.15(3a).

[172] Executive Order from Governor Sundquist to the Department of Environment and Conservation, August 9, 2001. Tennessee Department of Economic and Community Development. 2002. Frequently Asked Questions on Merchant Power Plants in Tennessee.

[173] Hydroelectric facility licenses are issued by FERC.

[174] Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003. Personal communication with Charles P. Nicholson, John J. Jenkinson, John T. Baxter, and Peggy W. Shute, Tennessee Valley Authority, March 20, 2003.

210. Utilities infrastructure, including water, natural gas, sewer, and electrical transmission lines, have the potential to negatively impact the mussels.[175] In particular, activities such as construction or maintenance of shoreline or in-stream structures may result in direct disturbance of the sediment habitat for the mussels or increased siltation from upstream activity. It is likely that new shoreline and in-stream structures and pipeline crossings will be constructed over the next ten years, and consultations with the Service are expected to occur on all proposed critical habitat units and areas essential to the conservation of the mussels.[176]

211. The TVA operates transmission lines throughout the Tennessee Valley.[177] Potential transmission line activities that can adversely affect the mussels include construction or improvement of transmission lines and maintenance of transmission lines. However, it is unlikely new transmission lines will be built in or adjacent to these units in the next ten years. On the maintenance side, TVA Right-of-Way Program Administrators develop vegetation clearing plans specific to each line segment, with vegetation management activities occurring on two or five year schedules.

Baseline

212. FERC consults on pipeline projects that have the potential to impact threatened and endangered species and their habitat.[178] For projects that may impact wetlands or cross water bodies, FERC maintains a list of construction and mitigation procedures. These mitigation procedures include the use of directional drilling, rather than open cut construction, and push for mitigation activities during the proposal stage.[179] Accordingly, approximately 80 percent of potential impacts are mitigated prior to section 7 consultation with the Service.

213. TVA policies provide baseline protection to the mussels by minimizing the effects of operations on the environment, and requiring compliance with environmental laws and

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[175] Personal communication with U.S. Fish and Wildlife Service staff, Tennessee, Alabama, Mississippi, Kentucky, and Virginia Field Offices, January 28, 2003.

[176] Personal Communication with William James, USACE, March 10, 2003. Personal Communication with Bob Ramsey, Contract engineer for Marshall County, February 20, 2003. Personal Communication with Brock Hill, Cumberland County Executive, February 20, 2003. Personal Communication with James Parson, Director of Utilities, Lee County, February 25, 2003. Personal Communication with Larry Murdock, Duck River Development Agency, February 24, 2003

[177] Personal communication with Charles P. Nicholson, Peggy W. Shute, and John J. Jenkins. Tennessee Valley Authority, Environmental Policy and Planning, January 30, 2003, March 20, 2003, and May 2, 2003.

[178] Personal communication with Robert Arvedlund, Federal Energy Regulatory Commission, February 25, 2003

[179] *Wetland and Waterbody Construction and Mitigation Procedures*. Federal Energy Regulation Commission. January 17, 2003.

regulations.[180] TVA BMPs for transmission line construction and maintenance activities require erosion and sediment control measures, including planning considerations, site re-vegetation, equipment use limitations, slope restrictions, and herbicide use restrictions.[181]

214. State water quality standards also provide some baseline protection, for example the Tennessee Water Control Board requires permit applicants to evaluate practicable alternatives.[182]

Future Consultations

215. FERC, TVA, and the USACE are the likely lead Action agencies in section 7 utility consultations with the Service. FERC regulates the rates and transport of natural gas, oil, and electricity under the Department of Energy Organization Act.[183] While FERC maintains a short-term "On the Horizon" listing of major pipeline projects, the agency is unable to estimate the number or location of projects which may require consultation with the Service in the proposed critical habitat units over the next 10 years.[184] These activities may also require a 404 Clean Water Act and/or Section 10 permit from the USACE. Further, the TVA also owns and operates transmission systems within a large portion of the proposed critical habitat and may also consult with the Service.[185]

216. Approximately 90 to 120 informal and one to four formal consultations related to utility activities are expected over the next ten years. This analysis estimates total administrative costs for utility activities, including electrical transmission lines, will range from $220,000 to $1,1900,000 ($170,000 to $1,060,000 informal and $10,000 to $90,000 formal consultation costs).[186]

217. While FERC anticipates consulting on larger pipeline projects, smaller projects may result in a few section 7 consultations due to FERC's blanket certificate program. Blanket

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[180] TVA. Principles and Practices Manuel. Revised 2002. http://www.tva.com/foia/readroom/policy/prinprac/index.htm, as viewed on February 19, 2003.

[181] Austin, Chris, Chris Brewster, Alicia Lewis, Kenton Smithson, Tina Broyles, and Tom Wojtalik. 1999. A guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities. Tennessee Valley Authority, Transmission/Power Supply Group.

[182] Tennessee. Code Ann., §69-3-101.

[183] Department of Energy Organization Act, 42 U.S.C. §7112.

[184] Personal communication with Robert Arvedlund, Federal Energy Regulatory Commission, February 25, 2003.

[185] *TVA's Transmission System*, accessed at http://www.tva.gov/power/xmission.htm on February 4, 2002.

[186] Cost for the consultations for Area 1 French Broad River and Area 2 Holston River are less than reported in Exhibit 3-1 as TVA anticipates their cost of consultation would be $500 because of past programmatic consultations in this area. See Section 4.2.11 for a more in depth discussion. Personal communication with Charles P. Nicholson, and Peggy W. Shute, Tennessee Valley Authority, May 2, 2003.

certificates allow project proponents to construct facilities with little interaction from FERC provided they avoid impacting habitat. Prior to receiving a blanket certificate, each project must receive a letter of concurrence from the Service ensuring compliance with environmental regulations.[187]

218. The USACE issues permits under section 404 of the Clean Water Act for all proposed units and areas. Unit 1 Duck River, Unit 10 Buck Creek, and Area 1 French Broad River are also navigable waters, and require USACE permits under section 10 of the Rivers and Harbors Act. USACE expects to be lead Action agency for 52 to 82 informal and one to four formal consultations over the next ten years.[188] TVA expects to coordinate with USACE on its 26(a) permit consultations for utilities (other than transmission lines). Information detailing the breakdown of these consultations by unit and area is provided in Appendix D.

219. TVA carries out and funds the construction and maintenance of electrical transmission lines in the Tennessee Valley. This analysis anticipates 38 low level informal consultations associated with transmission lines during the next ten years.[189] Information detailing the breakdown of these consultations by unit and area is provided in Appendix D.

Project Modifications

220. The cost of project modifications for utility projects will be approximately $38,000. The costs associated with modifications to pipeline, water intake or outflow structures, or transmission line construction or maintenance projects are discussed below.

- Potential modifications for pipeline projects include rerouting ($600,000 to $800,000 per mile).[190] Situations which could require re-routing are typically identified and mitigated during project design stage avoiding the high cost associated with such actions. As such, the number of pipeline projects that could require re-rerouting in the future cannot be estimated. Costs for implementing other project modifications are not available, however they are described by FERC as minimal relative to the total cost of pipeline construction.

- Mussel relocation may be recommended by the Service for water intake or outflow

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[187] Personal communication with Robert Arvedlund, Federal Energy Regulatory Commission, February 25, 2003

[188] The Patriot Pipeline is currently under construction. As FERC has already authorized the project this analysis anticipates any future consultations are captured by the USACE's estimates for future section 404 permits for stream crossings. Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003, and May 6, 2003. Personal communication with Annette Poore, USACE Clinch Valley Field Office, Norfolk District, Abingdon, Virginia, April 4, 2003, and April 7, 2003.

[189] Personal communication with Charles P. Nicholson, John J. Jenkinson, John T. Baxter, and Peggy W. Shute, Tennessee Valley Authority, March 20, 2003.

[190] Personal communication with Robert Arvedlund, Federal Energy Regulatory Commission, February 25, 2003

structure projects ($1,800 to $15,000 per project).[191]

- Project modifications are unlikely to be recommended by the Service for transmission line activities.[192] However, each project will likely incur an additional review costs of $1,000, or a total of $38,000.

4.2.12 Residential and Related Development

221. Consultations regarding residential and related development activities occur through associated infrastructure, such as construction of utility pipelines, water supply, wastewater systems, and roads.[193] Infrastructure associated with residential and related development is addressed in other sections, such as utilities, road and bridge construction, and NPDES permit review. Thus, any increases in residential or related development costs are captured by associated activities.

222. Reductions in property value may occur through public perception that the designation will restrict land uses, inhibit private development, or cause project delays. Such loss in property value can be experienced for as long as such perception persists. However, this effect is likely to be temporary in nature as the uncertainties and perceptions, particularly

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[191] Personal communication with William James, USACE, March 21, 2003

[192] Personal communication with Charles Nicholson, John Jenkinson, and Peggy Shute, Tennessee Valley Authority, Environmental Policy and Planning, March 20, 2003, and May 2, 2003.

[193] Infrastructure construction is often associated with residential and commercial development. Knox County anticipates urban and planned growth along Area 1 French Broad River and Unit 2 Holston River over the next ten years. Only Scott and Tazewell counties in Virginia anticipate beginning construction of commercial development projects within or adjacent to proposed critical habitat within the next ten years. Growth Policy Coordinating Committee. Knoxville, Farragut, Knox County Growth Policy Plan. January 12, 2000. Personal communication with Bob Ramsey, Contract engineer for Marshall County, February 20, 2003. Personal communication with Brock Hill, Cumberland County Executive, February 20, 2003. Personal communication with Tim Long, Lee County (VA) Industrial Development. February 21, 2003. Personal communication with Steve Gibson, Lenowisco, February 21, 2003. Personal communication with James Parson, Director of Utilities, Lee County (VA), February 21, 2003. Personal communication with County Judge-Executive BeShears. Pulaski County, KY, February 25, 2003. Personal communication with John Strutner, Scott County (TN) Adminstrator, February 26, 2003. Personal communciation with Glen Skinner, Deputy Director, Lenowisco, February 26, 2003. Personal communication with Roger Ledbetter, Superintendent of the Fentress County Utility Dist. February 27, 2003. Personal communication with Dennis Karr, Laurel County, Industrial Development Authority, February 27, 2003. Personal communication with Laurence Kuhl, County Judge Executive, Laurel County, February 27, 2003. Personal communication with Jim Spencer, Tazewell County Administrator, February 27, 2003. Personal communication with Crockett Lee, County Executive, Hawkins County, February 27, 2003. Personal communication with Tony Jones, Deputy Judge and Blaine Phillips, County Judge Executive, McCreary County, February 24, 2003. Personal communication with David Perky, County Executive, Hamblen County, February 20, 2003. Personal communication with Donald Hurst, Newport-Cocke County, Economic Development Commission, February 13, 2003. Personal communication with Larry Murdock, Tennessee Duck River Development Agency, February 24, 2003. Personal communication with Gretchen Beal, Information Services Director, Knoxville Knox County Metropolitan Planning Commission, April 29, 2003. Personal communication with David Taylor, Sevier County Planning Office, April 29, 2003. Personal communication with Tim Seals, Zoning Officer, Jefferson County, April 29, 2003. Personal communication with Paul Q. Merritt, County Executive, Grainger County, April 29, 2003.

regarding the scope of protection afforded the species over strictly private activities, dissipate and/or become clarified over time. Alternatively, some or all of the units may experience increases in property value due to a perception of restricted development, as preservation of open space can have a positive effect on property value.

223. In addition, Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop a Habitat Conservation Plan (HCP) in order to meet the conditions for issuance of an incidental take permit from the Service in connection with the development and management of a property.[194] Development of HCPs within critical habitat would require an internal section 7 consultation with the Service. However, no HCPs have been developed regarding these five mussel species in the past and the Service does not anticipate that any will be developed in the future.[195]

4.2.13 Conservation and Recreation

224. Approximately 76 to 84 informal consultations and one formal consultation related to conservation and recreation activities are expected over the next ten years. This analysis estimates total administrative costs for conservation and recreation activities will range from $120,000 to $550,000 ($110,000 to $530,000 informal and $10,000 to $20,000 formal consultation costs).[196]

Partners for Fish and Wildlife

225. PFW is a voluntary partnership program between the Service and landowners interested in restoring streamlands, wetlands and other important fish and wildlife habitats on their own lands. The program provides various types of support ranging from technical assistance to private landowners through voluntary cooperative agreements, to funding restoration projects on private lands. Voluntary habitat restoration on private lands usually involves dollar-for-dollar cost share with private landowners and Federal, State, and local entities. Landowners sign agreements to maintain the restoration projects for the life of the agreement and otherwise retain full control of their land.[197] Since the projects are funded and/or carried out by the Service, internal consultation may take place for each project. Because these projects are intended to be beneficial to the mussels and their habitat, the consultations are likely to be informal, and project modifications are not expected.

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[194] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning." From: http://endangered.fws.gov/hcp/, August 6, 2002.

[195] Personal communication with U.S. Fish and Wildlife Service staff, Cookeville Field Office, February 12, 2003.

[196] Cost for the consultations for Area 1 French Broad River and Area 2 Holston River are less than reported in Exhibit 3-1 as TVA anticipates their cost of consultation would be $500 because of past programmatic consultations in this area. See Section 4.2.11 for a more in depth discussion. Personal communication with Charles P. Nicholson, and Peggy W. Shute, Tennessee Valley Authority, May 2, 2003.

[197] U.S. Fish and Wildlife Service, *Partners for Fish and Wildlife Program*, accessed at http://www.fws.gov on July 2002.

Approximately 26 informal consultations related to PWF partnerships are expected over the next ten years, six on Unit 1 Duck River, three on Unit 3 Obed River, four on Unit 4 Powell River, two on Unit 5 Clinch River, six on Unit 6 Nolichucky River, one on Unit 7 Beech Creek, four on Unit 10 Buck Creek.[198]

Boat Ramps

226. Boat ramps for public recreation facilities, campgrounds, and private use are anticipated in Unit 1 Duck River, Unit 5 Clinch River, Unit 6 Nolichucky River, Unit 9 Big South Fork, Area 1 French Broad River, and Area 2 Holston River. The typical Federal nexuses for boat ramp construction is CWA §404 permitting from the USACE and/or 26(a) permitting from the TVA for projects in the Tennessee River watershed that may impact navigation, flood control, or public lands.

227. The USACE anticipates consulting with the Service informally with respect to construction or maintenance of boat ramps 29 to 35 times over the next ten years (one to two in Unit 1 Duck River, one in Unit 5 Clinch River, one in Unit 9 Big South Fork, 11 in Area 1 French Broad River, and 15 to 20 in Area 2 Holtson River).[199] The TVA anticipates consulting informally with the Service 32 to 38 times over the next 10 years (one to two in Unit 1 Duck River, two to five in Unit 5 Clinch River, two to four in Unit 6 Nolichucky River, 15 in Area 1 French Broad River, and 12 in Area 2 Holston River), not including the one programmatic consultation regarding all activities TVA has permitting authority over on the French Broad and Holston Rivers.[200] TVA is expected to be the lead agency for the Unit 1 Duck River projects, Unit 5 Clinch River projects, Unit 6 Nolichucky River projects, Area 1 French Broad River projects, and Area 2 Holtson River projects. The USACE is expected to be the lead agency for the Unit 9 Big South Fork project. Thus, this analysis anticipates 33 to 39 informal consultations on boat ramp projects over the next ten years. Proper construction of the ramps can avoid negative impacts to the mussels, so no project modifications are anticipated.

Watershed Team Activities

228. The TVA Watershed Team program implements resource conservation strategies on TVA owned or administered property through various activities, including the installation of docks, cattle exclusion barriers, stream crossing structures, community septic systems, and stream-side agricultural buffer zones.[201] TVA anticipates 17 to 19 informal and one formal consultation over the next ten years for these activities, one on Unit 2 Bear Creek, six on Unit

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[198] Personal communication with Service Biologist, Fish and Wildlife Service, February 10, 2003.

[199] Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003.

[200] Personal communication with Charles P. Nicholson, John J. Jenkinson, John T. Baxter, and Peggy W. Shute, Tennessee Valley Authority, March 20, 2003.

[201] Personal communication with Kim Pilarski, Tennessee Valley Authority, March 24, 2003.

4 Powell River, and ten to 12 on Unit 5 Clinch River. No project modifications are anticipated.

4.2.14 WaterQuality Activities

229. The Environmental Protection Agency (EPA) may engage in section 7 consultations with the Service regarding water quality standards to ensure that they are appropriately protective of endangered and threatened species. EPA typically considers listed species when consulting with the Service on the following categories of water quality program activities:

- **Total maximum daily load (TMDL) approvals.** Assignment of TMDL levels falls under section 303 (d) of the CWA. Consultations on TMDLs arise when the combination of point and non-point source pollutants causes a noncompliance in a body of water. If out of compliance, a water body is added to the State's section 303 (d) list of impaired waters.[202] The EPA consults with the Service regarding TMDLs on 303 (d) streams listed for aquatic life criteria impairments. Impairments that effect the mussels' habitat include: sediments, siltation, organic enrichment, low dissolved oxygen, and flow alteration.[203] Four 303 (d) streams listed for aquatic life criteria impairments occur in the mussels proposed critical habitat area.

- **State 303 (d) lists.** State agencies must provide EPA with a proposed list of 303 (d) river segments for approval. Historically, the EPA has consulted with the Service every other year regarding review of these lists. In July of 1991, however, the EPA engaged in a programmatic consultation to streamline review of 303 (d) lists for all Region 4 States, including Alabama, Kentucky, Mississippi, and Tennessee. The new process contemplates potential impact to endangered species and habitat, and therefore avoids consulting as frequently as in the past. In Region 3, which includes Virginia, the Service does not consult on 303(d) listed waters.[204]

- **State Water Quality Standards.** The EPA reviews water quality standards within each State approximately every three years. A consultation would be initiated with the Service to ensure that such review appropriately considers, impacts to wildlife, including those to endangered species.

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[202] Clean Water Act, § 131.10

[203] Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 27, 2003.

[204] Personal communication with Peter Gold, Environmental Protection Agency, Region 3, March 6, 2003.

- **Special Appropriation Projects (SPAPs)**. The EPA funds water improvement projects such as increasing the capacity of drinking water facilities, or construction or improvement of wastewater facilities.[205]

230. EPA's National Pollutant Discharge Elimination System (NPDES) permit program regulates point source pollution. The Service reviews each permit application to confirm that listed species are not adversely affected by water quality impacts. If the proposed permit does not appear to meet State water quality standards, the Service may object to issuance of the permit, and the State may ask the applicant to alter the permit to meet the standards. According to a 2001 Memorandum of Agreement between the EPA, National Marine Fisheries Service (NMFS), and the Service, the EPA has provided States and tribes authority over their Clean Water Act permitting when appropriate.[206] Accordingly, NPDES permitting may generate a technical assistance effort between the Service and the designated representative of the EPA (i.e., the respective State agencies) for review of the permit to ensure it appropriately considers the mussels and their habitat.

Baseline

231. All water quality-related projects within the proposed critical habitat are subject to the provisions of the CWA and State water quality standards as outlines in Section 2.2.1 and Appendix B of this analysis. In their review of State water quality standards EPA ensures the water bodies meet their respective uses, including recreation and providing habitat to threatened and endangered species. As such, State water quality standards intend to meet the needs of the mussels and consultations regarding water quality activities are primarily informal, without recommended project modifications.[207]

Future Consultations

232. Water quality activities in the proposed critical habitat for the mussels are anticipated to result in up to 22 to 36 informal and seven formal consultations the next ten years. Administrative costs will range from $200,000 to $910,000 (informal costs of $130,000 to $710,000, and formal costs of $70,000 to $200,000).[208]

233. The EPA must approve TMDLs levels along 303 (d) designated streams. Four stream segment within critical habitat are on the State 303 (d) list due to water quality criteria impairments (Bear Creek for sediments/siltation, Duck River for organic enrichment/low

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[205] Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 27, 2003.

[206] U.S. Environmental Protection Agency, Department of the Interior, and the Department of Commerce, *Memorandum of Agreement Between the Environmental Protection Agency, Fish and Wildlife Service and National Marine Fisheries Service Regarding Enhanced Coordination Under the Clean Water Act and Endangered Species Act; Notice*, Federal Register Vol. 66, No. 36, February 22, 2001.

[207] Clean Water Act, § 131.11 and § 130.7.

[208] See Exhibit 3-1.

dissolved oxygen and flow alteration, the Clinch River for general water quality standards/benthic, and the Nolichucky River for sediments/siltation). EPA anticipates consulting once per impairment on each of these rivers over the next ten years. Thus, five formal consultations are anticipated for TMDLs over the next ten years. Although such consultations may have been resolved informally in the past, these informal consultations were particularly lengthy, and the resulting costs more accurately represented by the effort level and associated cost of a formal consultation.[209]

234. EPA also consults with the Service regarding review of State 303 (d) lists and State water quality standards. In Region 4, one to four informal consultations are expected within each State in review of 303 (d) lists, and three informal consultations are anticipated within each State in review of water quality standards over the next ten years.[210] In Region 3, three to five informal consultations are anticipated over the next ten years for review of water quality standards.[211]

235. EPA funding of Special Appropriation Projects (SPAPs) regarding water quality improvements may also result in consultation if a project occurs within or adjacent to the proposed critical habitat for the mussels. It is likely that funding of drinking water or wastewater facility improvements will result in three informal and two formal consultations over the next ten years.

Project Modifications

236. Project modifications are not anticipated for approval of TMDLs, 303 (d) lists, or State water quality standards as provisions for the mussels are typically considered and recommendations of protective measures are often redundant with the CWA regulations.

237. The Service may recommend modifications to SPAP projects within mussel critical habitat, including special surveys and project redesign. Special surveys typically cost between $10,000 to $25,000. Project redesign may include relocation of pipelines and other infrastructure, and this may introduce a cost of about $25,000 per project. Project modification costs for water quality activities will range from $180,000 to $250,000 (i.e., $35,000 to $50,000 per project).

4.3 Estimated Technical Assistance Efforts

238. Cost estimates for technical assistance are based on recent experience at the Service's Cookeville Field Office. Costs associated with these efforts include the opportunity cost of

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[209] Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 26, 2003 and March 17, 2003.

[210] Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 27, 2003.

[211] Denise Halkowski, Environmental Protection Agency, Region 3, March 6, 2003.

Service personnel time, as well as third party staff costs. Per effort costs associated with technical assistance are presented in Exhibit 3-1.

239. Based on the number of technical assistance efforts specifically addressing the mussels during the past five years, this analysis assumes that the Service will receive 467 to 528 requests over the next ten years. On average, technical assistance efforts required 10 minutes of Service personnel time, and Service staff time is estimated to cost $63 per hour. Therefore, on average, technical assistance requests cost approximately $10 per request. Assuming technical assistance requests continue at the historic rate (100 over ten years), plus NPDES permit review (65 to 108 over ten years) and coal mining permit review(302 to 320 over ten years), the cost to the Service for technical assistance is expected to be $4,700 to $5,300 over the next ten years. Add to this the cost to third parties, and the total cost of technical assistance efforts over the next ten years is estimated to range from approximately $280,000 to $800,000. Most of these costs will be incurred by third parties such as State agencies and private landowners.

4.3.1 NPDES Permit Review

240. In all five States, the Service is notified and receives copies of draft NPDES permits from State environmental agencies. NPDES permitted activities requiring EPA oversight are for discharges exceeding one million gallons per day (1 MGD). Most NPDES activities within proposed critical habitat for the mussels do not meet this criteria and therefore do not require EPA oversight. Consequently, exchanges between State environmental agencies and the Service are classified as technical assistance efforts. These technical assistance efforts generally involve the Service notifying both State agencies and applicants about the presence of the mussels and ensuring that Federal and State water quality standards are addressed. This analysis estimates that approximately 65 to 108 technical assistance efforts regarding NPDES activities will occur over the next ten years.

241. In Alabama, the Service has commented on NPDES activities permitted by the ADEM. Effluent limitations and other restrictions contained in ADEM NPDES permits are consistent with EPA regulations and applicable State water quality standards and are designed to protect indigenous species of fish and wildlife, including endangered species. ADEM also applies guidelines within the Alabama Soil and Water Conservation Committee's Alabama Handbook Best Management Practices.[212] This analysis estimates 12 to 22 technical assistance efforts between the Service and ADEM regarding NPDES permitted activity over the next ten years.[213]

242. NPDES activities within the Mississippi portion of the proposed designation typically

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[212] Personal and written communication with Richard Hulcher, Alabama Department of Environmental Management, Mining and Nonpoint Section, Field Operation Division, February 24 and 26, 2003.

[213] Personal communication with James McIndoe, Alabama Department of Environmental Management, Water Division, March 6, 2003.

Personal communication with Richard Hulcher, Alabama Department of Environmental Management, Mining and Nonpoint Section, Field Operation Division, March 7, 2003.

relate to wastewater discharge. Current discharges are from the Tishimingo State Park, two publically owned waste water treatment facilities, and one industrial facility.[214] This analysis estimates up to ten technical assistance efforts will take place over the next ten years regarding NPDES permit review in Mississippi.

243. The Service has reviewed VPDES activities permitted by the VDEQ. Activities currently permitted include waste water treatment plants, water treatment plants, and sewage treatment facilities.[215] VEQ anticipates seven to 14 technical assistance efforts with the Service within the next ten years.

244. The Service has reviewed NPDES activities permitted by TDEC. Activities currently permitted include waste water treatment plants, domestic discharges, and water intakes. TDEC anticipates ten technical assistance efforts with the Service within the next ten years.[216]

245. The Service has reviewed KPDES activities permitted by KDEP. Activities currently permitted include waste water treatment plants, and coal discharges (coal discharges are discussed below). KDEP anticipates 36 to 52 technical assistance efforts with the Service within the next ten years.[217]

4.3.2 Coal Mining Permit Review

246. Under SMCRA, Kentucky and Virginia have been given the responsibility for regulating surface coal mining and reclamation. The States of Kentucky, through the DSMRE, and Virginia, through the DMLR, have the regulatory authority to issue surface coal mining permits. Because Kentucky and Virginia have regulatory authority, there is no nexus and no section 7 consultation. The State of Tennessee does not have primacy, and OSM issues all surface mining permits in this State.

247. In Virginia, the DMLR anticipates it will process 250 to 400 surface coal mining permits in the State annually (150 to 200 new permits or permit revisions and 100 to 200 permit renewals). Of these annual permits, 30 will occur in Unit 5 Clinch River (4 new permits, 20 permit renewals, and 6 permit revisions). The Unit 4 Powell River is downstream of the coal mining areas and does not encompass any coal mine operations. Thus this analysis

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[214] Personal communication with Leslie Barkley, Mississippi Department of Environmental Quality, March 12, 2003.

[215] Personal communication with Jon van Soestbergen, Virginia Department of Environmental Quality, Office of Water Permits Support, March 12, 2003.

[216] Personal communication with Saya Qualls, Tennessee Department of Environment and Conservation, Water Pollution Control, February 27, 2003, and April 29, 2003.

[217] Personal communication with Cliff Schneider, Kentucky Department of Environmental Protection, April 8, 2003, April 28, 2003.

anticipates 300 technical assistance efforts with DMLR over the next ten years.[218]

248. In Kentucky, DSMRE estimates it will process two to 20 new permits or permit revisions in or nearby the proposed critical habitat units during the next 10 years.[219] Any coal mining in the area occurs upstream, and the mines do not drain into the proposed critical habitat units. Thus, this analysis anticipates up to 18 technical assistance efforts with the DSMRE during the next ten years.

4.4 Potential Impacts on Small Entities

249. Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).[220] However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.[221] SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, Appendix C provides a screening level analysis of the potential effects of critical habitat designation on small entities to assist the Secretary in making this certification.

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[218] Personal communication with Les Vincent, Customer Services Unit Manager, Department of Mines, Minerals & Energy, Division of Mined Land Reclamation, Big Stone Gap Field Office, Big Stone Gap, Virginia, March 4, 2003.

[219] Personal communication with Dr. Richard J. Wahrer, Environmental Scientist, Kentucky Department for Surface Mining Reclamation and Enforcement, Frankfort, KY, March 4 and March 6, 2003.

[220] Small businesses are defined by the Small Business Administration, most commonly in terms of the number of employees or annual receipts. A small organization is "any not-for-profit enterprise...which is independently owned and operated and is not dominant in its field." A small government is the government of a city, county, town, school district, or special district with a population of less than 50,000, not including tribal governments. Regulatory Flexibility Act, 5 U.S.C. 601 et. seq.

[221] Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" **and** a threshold for a "substantial number of small entities." See 5 U.S.C. 605 (b).

250. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al*. (1986), Stoll and Johnson (1984)). Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation (see examples in Pearce and Moran (1994) and Fausold and Lilieholm (1999)). Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend (ECONorthwest [2002]).

251. However, a purpose of the Act is to provide for the conservation of endangered and threatened species. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the potential for recreational use of a species (e.g., bird viewing opportunities) should recovery be achieved. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.

252. In addition, as a result of actions taken to preserve endangered and threatened species, various other benefits may accrue to the public. Such benefits may be a direct result of modifications to projects made following section 7 consultation, or may be collateral to such actions. For example, a section 7 consultation may result in the requirement for buffer strips along streams, in order to reduce sedimentation due to construction activities. A reduction in sediment load may directly benefit water quality, while the presence of buffer strips may also provide the collateral benefits of preserving habitat for terrestrial species and enhancing nearby residential property values (e.g., preservation of open space).

253. This chapter describes the benefits resulting from implementation of section 7 of the Act, in the context of areas affected by the proposed designation for the mussels. It describes possible direct human use benefits resulting from measures taken to protect the species and also provides a qualitative discussion of ancillary environmental and economic benefits associated with measures taken to protect the habitat of the mussels.

254. As discussed below, it is not feasible to fully describe and accurately monetize the benefits of this designation in the context of this economic analysis. The discussion presented in this report provides insight into the potential benefits of the designation based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

5.1 Categories of Benefits

255. Implementation of section 7 of the Act is expected to substantially increase the probability of recovery for the mussels. Such implementation includes both the jeopardy provisions afforded by the listing, as well as the adverse modification provisions provided by the designation. Specifically, the section 7 consultations that address the mussels will assure that actions taken by Federal agencies do not jeopardize the continued existence of the mussels or adversely modify their habitat. Note that these measures are separate and distinct from the section 9 "take" provisions of the Act, which also provide protection to this species.

256. The benefits of critical habitat designation can therefore be placed into two broad categories: those associated with the primary goal of species conservation, and those that derive mainly from the habitat protection required to achieve this primary goal. In the case of the mussels, habitat protection provides for a variety of environmental benefits, including:

- **Decreased sedimentation and decreased turbidity** resulting from erosion control measures, habitat protection, restoration, and enhancement projects.
- **Stable water volume, flow, and depth** resulting from erosion control measures.
- **Decreased habitat loss** resulting from erosion control measures, habitat protection, restoration, and enhancement projects.
- **Substitute habitat (mitigation)** resulting from habitat protection, restoration, and enhancement projects.

257. Exhibit 5-1 details those activities expected to generate section 7 consultations leading to project modifications associated with the proposed critical habitat for the mussels, organized by the category of physical/biological improvement expected to result from the project modification. Specifically, this exhibit identifies the physical/biological improvements expected to result from implementation of section 7 of the Act and existing baseline protections. Uncertainty exists in appropriately allocating the number and costs of certain project modifications between existing baseline regulations, such as the Tennessee Water Quality Control Act, the Federal Power Act, and the implementation of section 7 of the Act. Therefore, to most accurately portray the benefits to the mussels that may result from implementation of section 7 of the Act, the "Allocation" column of exhibit 5-1 identifies whether each physical/biological improvement is expected to result solely from implementation of section 7 of the Act or jointly with existing baseline protections.

258. For example, it is expected that 309 to 412 consultations will result in project modifications providing for stable water quality. These are expected to result from consultations regarding bank stabilization (170 to 213 consultations), road and bridge construction (115 to 172 consultations), coal mining (one to two consultations), special appropriation projects (five consultations), and Watershed Team Activities (18 to 20) spread across all 13 proposed critical habitat units and three areas essential to the conservation of the mussels.

259. The physical/biological improvements listed in Exhibit 5-1 may in turn provide for a variety of economic benefits. For example, reduced sedimentation and turbidity may improve fish populations, resulting in improved recreational fishing opportunities. The discussion below provides qualitative descriptions of the economic benefits associated with these environmental improvements. As noted, while it is possible to estimate the number of projects that will generate consultations requiring project modifications, existing data do not allow for quantification or monetization of the ecological implications of these requirements.

Exhibit 5-1
Physical/Biological Improvements Expected to Result from Implementation of Section 7 of the Act

Physical/Biological Improvement	Expected Project Modification	Activity	Number of Expected Consultations*
Decreased sedimentation Decreased turbidity Stable water volume, flow, and depth Decreased habitat loss Substitute habitat	Erosion control measures Habitat protection, restoration, and enhancement projects Project redesign to avoid habitat Use of natural materials	Road & Bridge construction; Bank Stabilization Coal Mining Special Appropriation Projects (EPA) Watershed Team Activities	61 to 110 informal; 54 to 62 formal 167 to 204 informal; 3 to 6 formal 1 to 2 informal 3 informal; 2 formal 17 to 19 informal; 1 formal

5.1.1 Benefits Associated with Species Conservation

Use Value

260. The value that the public holds for species preservation may include a direct use component related to viewing opportunities. However, valuation research in this area has generally focused on more conspicuous terrestrial species. Similarly, individuals may value species preservation to the extent that it increases the probability of future consumptive use. This is unlikely to be significant in the case of the mussels given little to no historical recreational harvest.

261. Freshwater mussels have historically been used for a variety of commercial purposes. Notably, in the late 19th century mussel shells were harvested to create "pearl buttons" for shirts. This trade ended with the development of synthetic substitutes. In more recent years, freshwater mussels were harvested in the U.S. to provide nuclei for the cultivated pearl industry. Significant numbers of mussels were harvested in the South (including Tennessee) to support this export industry; in fact, harvest in some States rose to a level that threatened mussel populations (both those species that were the target of the harvest effort as well as those simply impacted by harvest activities). Restrictions on freshwater mussel harvests to protect all mussel species are now in effect in many States, including Alabama and Tennessee.

262. While freshwater mussels provide some commercial economic benefit, the shell of the mussels which are the subject fo this analysis do not have the characteristics valued by the pearl industry. As such, it was not commercially harvested historically.[222] In addition, this species' population is not expected to recover sufficiently in the foreseeable future to allow for commercial exploitation. Furthermore, critical habitat will likely result in limits on commercial harvest of other mussel species in the areas of the designation. Thus, commercial benefits are not expected to result in the foreseeable future from the recovery of the mussels.

Existence Value

263. A number of published studies have demonstrated that the public holds values for endangered and threatened species separate and distinct from any expected direct use of these species (i.e., a willingness to pay to simply assure that a species will continue to exist). These studies include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996). While the public's willingness to pay for preservation and enhancement of a wide-range of species has been studied, no studies have addressed the non-use values associated with endangered and threatened freshwater mussel species. Thus, it is not possible to develop a monetary measure of this category of benefit.

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[222] US Fish and Wildlife Service. 2003. Agency Draft Recovery Plan for the Common names Cumberland Elktoe, Oyster Mussel, Cumberlandian Combshell, Purple Bean, and Rough Rabbitsfoot. Atlanta GA, 176 pgs.

5.1.2 Benefits Associated with Habitat Protection

264. As noted above, habitat preservation provides for a range of economic benefits, as discussed below.

Sport Fishing

265. Designation of critical habitat for the mussels may result in improved recreational fishing opportunities, given improved water quality and habitat. That is, recreational anglers may benefit from enhanced catch rates, a broader range of target species, and improved stream aesthetics. Associated benefits could include an increase in tourism and recreation-industry jobs and expenditures in areas of the designation. However, no data exist to quantify the extent of the improvement expected in area fisheries, and thus no monetization of this benefit category can be made.

Other Recreation Benefits

266. In addition to the long-term potential for improvements in regional sport fisheries, protecting critical habitat for this species may result in preservation of habitat suitable for other recreational uses, such as hunting, hiking, boating (e.g., kayaking), and swimming. In particular, the Obed River and the Big South Fork are popular whitewater boating destinations. Conservation of various habitats may in turn lead to increased tourism and contribute to the expansion of a tourist economy in certain counties.[223] In addition, such activities are likely to generate social welfare benefits to recreators. Quantification of these benefits, however, is limited by the same information constraints as discussed above. For example, to estimate the extent to which whitewater rafting opportunities will improve requires an understanding of the extent to which this activity is limited by current flow rates and water quality (e.g., modest changes in sedimentation may not result in a change in the experience of this category of recreationalist). Data on the expected environmental change are not available.

Overall Ecosystem Health

267. Freshwater mussels are an integral part of the ecosystems in which they live. Protecting the primary constituent elements for the mussels, including preserving water quality and natural flow regimes, will benefit other organisms that cohabit these areas. Each one of these organisms may in turn provide some level of direct or indirect benefit to the public and local economies.

268. Understanding the change in aquatic ecosystem health resulting from this designation would entail significant effort to model the likely changes in water quality as well as the ecological benefits of modified flow regimes. While these benefits can be described qualitatively, existing data are not available to quantify the scale of these changes,

[223] Of course, if designation of critical habitat somehow constrains these activities these constraints will be manifest as a cost of the designation.

such as required for monetization. For example, it is widely understood that reduced sedimentation in a river system can benefit various fish, shellfish, and aquatic plant communities. In addition, in some cases reductions in sedimentation may provide direct economic benefit (e.g., reducing the need for, or scale of, dredging operations). Quantifying these changes would, however, require additional information on the make-up of these aquatic communities and the baseline State of environmental quality. More importantly, such quantification would require detailed information on the nature and scope of project modifications resulting from section 7. Such information is not currently available due to the uncertainty about the modifications potentially associated with future projects.

Water Quality Benefits

269. Measures undertaken to protect the mussels habitat could lead to a variety of water quality benefits including: (1) protection of human drinking water supplies; (2) reduced cost of drinking water treatment; and (3) reduced cost of future stream restoration/maintenance activities. Again, quantification and monetization of these categories of benefits would require additional, detailed information on the scope and location of expected project modifications. For example, reductions in sediment load may reduce the cost of filtering municipal water supplies. The extent to which this category of benefits will be experienced, however, will depend on the location of the water systems, and the manner in which they operate (e.g., whether they utilize an instream water intake structure, or other system not impacted by sediment load).

Other Benefits

270. Additional benefits of designating critical habitat for the mussels may include educational/informational benefits (increased awareness by the public of the extent of the mussels habitat), increased support for existing conservation efforts, and reduced uncertainty regarding the extent of the mussels habitat. For example, critical habitat designation will provide a firm legal definition of the extent of the mussels habitat, which may reduce regulatory uncertainty. At this time sufficient information does not exist to quantify or monetize the benefits of this designation, and thus it is not possible to present monetized benefits on a unit-by-unit basis.

5.2 Assigning Benefits on a Unit-by-Unit Basis and to the Designation

271. Where possible, the benefits of critical habitat designation should be described on a unit-by-unit basis, and distinguished from the benefits that result from implementation of the jeopardy provisions of section 7 of the Act. The benefits discussed above arise primarily from the protection afforded to the mussels under the section 7 jeopardy provisions. Specifically, *future consultations - and any associated project modifications - are expected to be primarily associated with the listing of the species (i.e., the jeopardy provision of section 7), rather than the critical habitat designation (i.e., the adverse modification provision).*

REFERENCES

Alabama Department of Environmental Management. 1999. *Alabama's Best Management Practice's for Forestry.*

Alabama Soil and Water Conservation Committee. July 2002. *Alabama Handbook For Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas*.

American Rivers Organization. *Federal Power Act Summary*. Accessed at http://www.amrivers.org/hydropowertoolkit/hydroreformtoolkitlawsfpa.htm.

Aquatic Resource Assessment Team, Center for Aquatic Technology Transfer, US Forest Service. 2001. *An Assessment and Strategy for Conservation of Aquatic Resources of the Daniel Boone National Forest, Interim Report, April 2001.*

Bishop R.C. 1980. Endangered Species: An Economics Perspective. *Transactions of the 45th North American Wildlife and Natural Resources Conference.* The Wildlife Management Institute, Washington D.C..

Bishop R.C. 1978. Endangered species and uncertainty: the economics of a safe minimum standard. *American Journal of Agricultural Economics,* 60: 10-18.

Boyle, K. and R. Bishop. 1987. Valuing Wildlife in Benefit-Cost Analysis: A Case Study Involving Endangered Species. *Water Resource Research.* Vol. 23: 943-950.

Brookshire, D., L. Eubanks and A. Randall. 1983. Estimating Option Prices and Existence Values for Wildlife Resources. *Land Economics.* Vol. 59: 1-15.

Coal Industry Annual 1997, 1998, 1999, and 2000. Energy Information Administration, Office of Coal, Nuclear, Electric and alternative fuels, US Department of Energy. Accessed at
http://tonto.eia.doe.gov/FTPROOT/ coal/058497.pdf,
http://tonto.eia.doe.gov/FTPROOT/coal/058498.pdf,
http://tonto.eia.doe.gov/FTPROOT/coal/058498.pdf, and
http://tonto.eia.doe.gov/FTPROOT/coal/05842000.pdf

Coal Production and Number of Mines by State, County, and Mine Type, 2001, accessed at http://www.eia.doe.gov/cneaf/coal/page/acr/table2.html.

Cooperative Extension Service, University of Kentucky. *Field Guide to Best Management Practices for Timber Harvesting in Kentucky*. (Also includes *Kentucky Forest Practice Guidelines for Water Quality Management* and excerpts from the *Kentucky Agriculture Water Quality Authority Producer Workbook*.)

ECONorthwest, "Economic Benefits of Protecting Natural Resources in the Sonoran Desert," prepared for the Coalition for Sonoran Desert Protection, August 2002.

Elkstrand, Earl R. and John Loomis. November 1998. Incorporating Respondent Uncertainty When Estimating Willingness to Pay for Protecting Critical Habitat for Threatened and Endangered Fish. *Water Resources Research.* Vol. 34, No. 11.

Executive Order from Governor Sundquist to the Department of Environment and Conservation, August 9, 2001.

Fausold, Charles J. and Robert J. Lilieholm. 1999. The economic value of open space: a review and synthesis. *Environmental Management*. Vol. 23, No. 3: 307-320.

Federal Highway Administration. 1995. *Best Management Practices for Erosion and Sediment Control - Final Report October 1988- June 1995*. Federal Highway Administration, Washington, D.C. Eastern Federal Lands Highway Design. FHWA/FLP-94/005.

Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977.

Hageman, R.K. 1985. Valuing marine mammal populations: benefit valuation in a multi-species ecosystem. Administrative report No. LJ-85-22, National Marine Fisheries Service, Southwest Fisheries Center, La Jolla, CA. 88p.

Kentucky 2001 Oil Production. Accessed at http://www.uky.edu/KGS/emsweb/data/2001/oilinfo2k1.html.

Kentucky Division of Conservation. *Kentucky Agriculture State Water Quality Plan*. Accessed at www.environment.ky.gov/nrepc/dnr/conserve/ag_water_quality.htm on February 13, 2003.

Kentucky Transportation Cabinet. 2000. *Best Management Practices for Maintenance Activities in and Around Streams*.

Kotchen, Matthew J. and Stephen D. Reiling. 2000. Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species. *Ecological Economics*. Vol. 32: 93-107.

Loomis, John B. and Douglas S. White. 1996. Economic Benefits of Rare and Endangered Species: Summary and Meta-Analysis. *Ecological Economics*. Vol. 18: 197-206.

Maury Energy Projects, LLC. *Proposed Rieves Bend Road Power Plant - A Summary.* Accessed at http://www.cme-energy.com/projects/maury/project_summary.asp on February 19, 2003.

Memorandum from Assistant Director, Ecological Services, to Acting Director, Office of Surface Mining Reclamation and Enforcement. Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977," September 24, 1996.

Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, accessed at http://www.whitehouse.gov/omb/memoranda/m01-27.html

NRCS, Alabama Field Office, 2001. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.*

NRCS, Alabama Field Office. 2002. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Wetland Wildlife Habitat Management.*

NRCS, Kentucky Field Office. 2002. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Forest Stand Improvement.*

NRCS, Kentucky Field Office. 1998. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Stream Crossing (Interim).*

NRCS, Kentucky Field Office. 2003. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Stream Habitat Improvement and Management.*

NRCS, Kentucky Field Office. 2000. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.*

NRCS, Kentucky Field Office. 2001. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Wetland Wildlife Habitat Management.*

NRCS, Mississippi Field Office. 2000. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Stream Crossing.*

NRCS, Mississippi Field Office. 2000. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.*

NRCS, Tennessee Field Office. 2002. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Forest Stand Improvement.*

NRCS, Tennessee Field Office. 2002. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.*

NRCS, Tennessee Field Office. 2002. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Wetland Wildlife Habitat Management.*

NRCS, Virginia Field Office. 2002. *Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.*

Natural Resources and Environmental Protection Cabinet. 1995. *Best Management Practices For Surface Coal Mining*, Division of Water, Water Quality Branch, Nonpoint Source Section.

Pearce, David and Dominic Moran. 1994. *The Economic Value of Biodiversity.* The World Conservation Union. London: Earthscan.

Samples, K., J. Dixon, and M. Gowen. 1986. Information disclosure and endangered species valuation. *Land Economics,* 62: 306-312.

Section 404 of the Clean Water Act: An Overview. Accessed at http://www.epa.gov/owow/wetlands/facts/fact10.html.

Stoll, John R. and Lee Ann Johnson. 1984. Concepts of Value, Nonmarket valuation, and the Case of the Whooping Crane. *Transactions of the 49th North American Wildlife and Natural Resources Conference.*

Tennessee Department of Economic and Community Development. 2002. *Frequently Asked Questions on Merchant Power Plants in Tennessee.*

Tennessee Department of Transportation. 1995. *Standard Specifications For Road and Bridge Construction.*

Tennessee Division of Forestry. 1993. *Guide to Forestry Best Management Practices in Tennessee.*

Tennessee Statistical Energy Data, Energy Division, Tennessee Department of Economic & Community Development, Nashville, Tennessee.

Tennessee Valley Authority. 2002. *Principles and Practices Manuel.* Accessed at http://www.tva.com/foia/readroom/policy/prinprac/index.htm on February 19, 2003.

Tennessee Valley Authority. 2002. 2002 Annual Report. Accessed at http://www.tva.com/finance/reports/pdf/fy2002ar.pdf.

Tennessee Valley Authority. *TVA Reservoirs and Power Plants.* Accessed at http://www.tva. com/sites/ sites_ie2.htm on February 19, 2003.

U.S. Bureau of Economic Analysis. *Bearfacts: Colbert County, Alabama, 1999-2000.*

U.S. Bureau of Economic Analysis. *Bearfacts: Tishomingo County, Mississippi, 1999-2000.* Accessed at http://www.bea.doc.gov/bea/regional/bearfacts/bf1/28/b128141.htm.

U.S. Bureau of Economic Analysis. *Bearfacts: Virginia, 1999-2000.*

U.S. Bureau of Economic Analysis. *Regional Accounts Data: Local Area Personal Income.* Accessed at http://www.bea.doc.gov/bea/regional/reis/.

U.S. Census Bureau. *State and County QuickFacts.*

U.S. Census Bureau, "County and City Databook: 2000," accessed at

http://www.census.gov/statab/www/ccdb/html on March 19, 2003.

U.S. Environmental Protection Agency, Department of the Interior, and the Department of Commerce. *Memorandum of Agreement Between the Environmental Protection Agency, Fish and Wildlife Service and National Marine Fisheries Service Regarding Enhanced Coordination Under the Clean Water Act and Endangered Species Act; Notice*, Federal Register Vol. 66, No. 36, February 22, 2001.

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. *Memorandum to the Field, Regarding Application of Best Management Practices,* November 28, 1995.

U.S. Fish and Wildlife Service. 2003. *Agency Draft Recovery Plan for the Common names Cumberland Elktoe, Oyster Mussel, Cumberlandian Combshell, Purple Bean, and Rough Rabbitsfoot*. Atlanta, GA.

U.S. Fish and Wildlife Service. *Endangered Species and Habitat Conservation Planning*. Accessed at http://endangered.fws.gov/hcp/ on August 6, 2002.

U.S. Fish and Wildlife Service. *Fiscal Year 2003 Budget Justifications,* Appropriation: Land Owner Incentive Program, pp. 401.

U.S. Fish and Wildlife Service. July 2002. *Partners for Fish and Wildlife Program*. Accessed at http://www.fws.gov.

U.S. Fish and Wildlife Service. May 2003. *Proposed Designation of Critical Habitat for the Five Cumberlandian Mussels*.

U.S. Small Business Administration, "Small Business Size Standards matched to North American Industry Classification System (NAICS)," accessed at http://www.sba.gov/size/sizetable2002.html on March 14, 2003.

Zurawski, R.P. 1998. Oil and Gas Activity in Tennessee During 1997. Tennessee Division of Geology, Nashville, Tennessee.

Zurawski, R.P. 1999. Oil and Gas Activity in Tennessee During 1998. Tennessee Division of Geology, Nashville, Tennessee.

Zurawski, R.P. 2001. Oil and Gas Activity in Tennessee During 2000. Tennessee Division of Geology, Nashville, Tennessee.

Zurawski, R.P. 2002. Oil and Gas Activity in Tennessee During 2001. Tennessee Division of Geology, Nashville, Tennessee.

Alabama Department of Environmental Management, Water Division, Water Quality Program, Administrative Code, §335-6-11.

Clean Water Act, 33 U.S.C. §§130.7, 131.10, 131.11, 303, 305, 402.

Department of the Army Regional Permit 97-RP-2, 3, 4

Federal Power Act, 16 U.S.C. §§800, 803(j), 811 (1986).

Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666.

Flood Disaster Protection Act 42 U.S.C. §4001 *et seq.* (1973).

Kentucky Administrative Regulations, §405.7-24.

Kentucky Revised Statutes §401.5:031, 350.

National Flood Insurance Act 42 U.S.C. §4001 *et seq.* (1968).

National Wild and Scenic Rivers Act, 16 U.S.C. §§1271-1287 (1968).

Regulatory Flexibility Act, 5 U.S.C. 601 et. seq., 605 (b).

Soil and Resources Conservation Act, 16 U.S.C. §§2001-2009.

State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters, Adopted November 16, 1995.

Surface Mining Control and Reclamation Act, 30 U.S.C. §1202 (1977).

Tennessee. Code Ann., §69-3-101.

Unfunded Mandates Reform Act of 1995, 2 USC 1532.

Virginia Code Ann, §45.1-226, 62.1-44.15(3a).

Virginia Code Ann, 4§25-130-780.16, 4§25-130-816.45.

Watershed Protection and Flood Prevention Act, 16 U.S.C. §§1001-1009.

Personal communication with:

Alabama Department of Environmental Management, Mining and Nonpoint Section, Field Operation Division

Alabama Department of Environmental Management, Water Division

Alabama Department of Transportation

Department of Mines, Minerals & Energy, Division of Mined Land Reclamation, Big Stone Gap Field Office, Big Stone Gap, Virginia

Environmental Protection Agency, Region 3

Environmental Protection Agency, Region 4

Federal Highway Administration, Kentucky Division

Federal Highway Administration, Mississippi Division

Federal Highway Administration, Tennessee Division

Kentucky Department of Environmental Protection, Division of Water

Kentucky Department for Surface Mining Reclamation and Enforcement, Frankfort, KY

Kentucky Division of Forestry

Kentucky Geological Survey

Kentucky Transportation Cabinet

Mississippi Department of Environmental Quality

Mississippi Department of Transportation, Office of State Aid Road Construction

Natural Resource Conservation Service (NRCS)

Natural Resource Conservation Service, Alabama Field Office

Natural Resource Conservation Service, Kentucky Field Office

Natural Resource Conservation Service, Tennessee Field Office

Natural Resource Conservation Service, Virginia Field Office

Office of Surface Mining, Big Stone Gap Field Office, Big Stone Gap, Virginia

Office of Surface Mining, Knoxville, Tennessee

Office of Surface Mining, Lexington Field Office, Lexington, Kentucky

Tennessee Department of Environmental Conservation, Division of Geology, Nashville, Tennessee

Tennessee Department of Environment and Conservation, Water Pollution Control

Tennessee Department of Transportation

Tennessee Department of Transportation, Environmental Planning and Permits

Tennessee Division of Forestry

Tennessee Duck River Development Agency

Tennessee Valley Authority

Tennessee Valley Authority, Environmental Policy and Planning

Tishimingo County Engineers Office

Third Rock Consultants

Virginia Department of Environmental Quality, Office of Water Permits Support

Virginia Department of Transportation

United States Army Corps of Engineers, Nashville District East Office, Nashville, TN

United States Army Corps of Engineers, Permit Branch, Nashville District East Office, Nashville, TN

United States Army Corps of Engineers, Regulatory Branch, Norfolk District, Norfolk, VA

United States Fish and Wildlife Service, Cookeville Field Office, TN

United States Forest Service, Daniel Boone National Forest

United States National Park Service, Big South Fork River and Recreation Area

United States National Park Service, Obed Wild and Scenic River

APPENDIX A
OTHER LISTED SPECIES

Generally, if a consultation is triggered for any listed species, the consultation process will also take into account all other listed species known or thought to occupy areas on or near the project lands. As such, listing or critical habitat-related protections for other threatened or endangered species may benefit the mussels as well (i.e., provide baseline protection). However, due to the difficulty in apportioning the costs of consultations between various species as well as awareness that a consultation for the mussels would need to be conducted absent consultations for or involving other species, this analysis does not attempt to apportion the consultations and related costs reported by Action agencies between the mussels and other listed species, and assumes that all future section 7 consultations within the extant boundaries of the proposed critical habitat *are fully attributable to the presence of the mussels and their habitat*. The Service has conducted consultations on the mussels in combination with numerous species, as indicated in the table below.

OTHER LISTED SPECIES INCLUDED IN PAST CONSULTATIONS ON THE 5 CUMBERLANDIAN MUSSELS

Species	Status
Fish	
Slender Chub (*Erimystax (=Hybopsis) cahni*)	Endangered with critical habitat
Spotfin Chub (turquoise shiner) (*Cyprinella (=Hybopsis) monacha*)	Endangered with critical habitat
Blackside Dace (*Phoxinus cumberlandensis*)	Threatened
Bayou Darter (*Etheostoma rubrum*)	Threatened
Bluemask Darter (*Etheostoma*)	Endangered
Duskytail Darter (*Etheostoma percnurum*)	Experimental Population, Non-Essential
Pygmy Madtom *(Noturus stanauli)*	Endangered
Yellowfin Madtom (*Noturus flavipinnis*)	Endangered with critical habitat
Palezone Shiner *(Notropis albizonatus)*	Endangered
Mussels	
Southern Acornshell *(Epioblasma othcaloogensis)*	Endangered
Cumberland Pigtoe *(Pleurobema gibberum)*	Endangered
Finerayed Pigtoe *(Fusconaia cuneolus)*	Experimental Population, Non-Essential
Heavy Pigtoe *(Pleurobema taitianum)*	Endangered
Cumberland Bean (pearlymussel) *(Villosa trabalis)*	Experimental Population, Non-Essential
Green Blossom (pearlymussel) *(Epioblasma torulosa gubernaculum)*	Endangered
Tubercled Blossom (pearlymussel) *(Epioblasma torulosa torulosa)*	Experimental Population, Non-Essential
Turgid Blossom (pearlymussel) *(Epioblasma turgidula)*	Experimental Population, Non-Essential
Yellow Blossom (pearlymussel) *(Epioblasma florentina florentina)*	Experimental Population, Non-Essential
Alabama Lampmussel *(Lampsilis virescens)*	Endangered

OTHER LISTED SPECIES INCLUDED IN PAST CONSULTATIONS ON THE 5 CUMBERLANDIAN MUSSELS	
Species	**Status**
Catspaw (purple cat's paw pearlymussel) *(Epioblasma obliquata obliquata)*	Endangered
Clubshell *(Pleurobema clava)*	Experimental Population, Non-Essential
Black Clubshell *(Pleurobema curtum)*	Endangered
Ovate Clubshell *(Pleurobema perovatum)*	Endangered
Southern Combshell *(Epioblasma penita)*	Endangered
Appalachian Elktoe (Alasmidonta raveneliana)	Endangered with critical habitat
Fanshell *(Cyprogenia stegaria)*	Endangered
Alabama Heelsplitter (inflated) *(Potamilus inflatus)*	Endangered
Pale Lilliput (pearlymussel) *(Toxolasma cylindrellus)*	Endangered
Gulf Moccasinshell *(Medionidus penicillatus)*	Endangered
Appalachian Monkeyface (pearlymussel) *(Quadrula sparsa)*	Endangered
Cumberland Monkeyface (pearlymussel) *(Quadrula intermedia)*	Endangered
Orangenacre Mucket *(Lampsilis perovalis)*	Threatened
Pink Mucket (pearlymussel) *(Lampsilis abrupta)*	Endangered
Birdwing Pearlymussel (*Conradilla caelata*)	Endangered
Cracking Pearlymussel *(Hemistena lata)*	Endangered
Curtis Pearlymussel (*Epioblasma florentina curtisii*)	Endangered
Dromedary Pearlymussel *(Dromus dromas)*	Experimental Population, Non-Essential
Littlewing Pearlymussel *(Pegias fabula)*	Endangered
White Wartyback (pearlymussel) *(Plethobasus cicatricosus)*	Endangered
Rough Pigtoe *(Pleurobema plenum)*	Endangered
Shiny Pigtoe *(Fusconaia cor (edgariana))*	Endangered
Orangefoot Pimpleback (pearlymussel) *(Plethobasus cooperianus)*	Endangered
Ring Pink (Obovaria retusa)	Endangered
Finelined Pocketbook *(Lampsilis altilis)*	Threatened
Tan Rifflefhell *(Epioblasma florentina walkeri)*	Endangered
Snails	
Anthony's Riversnail *(Athearnia anthonyi)*	Endangered

OTHER LISTED SPECIES INCLUDED IN PAST CONSULTATIONS ON THE 5 CUMBERLANDIAN MUSSELS	
Species	**Status**
Crustaceans	Endangered
Nashville Crayfish *(Orconectes shoupi)*	Endangered
Plants	
Price's potato-bean *(Apios priceana)*	Threatened
Cumberland sandwort *(Arenaria cumberlandensis)*	Endangered
Cumberland rosemary (*Conradina verticillata*)	Threatened
Leafy prairie-clover (*Dalea (=Petalostemum) foliosa*)	Endangered
Tennessee purple coneflower *(Echinacea tennesseensis)*	Endangered
Eggert's sunflower *(Helianthus eggertii)*	Threatened
Small whorled pogonia *(Isotria medeoloides)*	Threatened
Spring Creek bladderpod *(Lesquerella perforata)*	Endangered
American chaffseed *(Schwalbea americana)*	Endangered
Virginia spiraea *(Spiraea virginiana)*	Threatened
Running buffalo clover *(Trifolium stoloniferum)*	Endangered
Tennessee yellow-eyed grass *(Xyris tennesseensis)*	Endangered
Mammals	
Gray Bat *(Myotis grisescens)*	Endangered
Indiana Bat (Myotis sodalis)	Endangered with critical habitat
Virginia big-eared Bat *(Corynorhinus (Plecotus) townsendii virginianus)*	Endangered with critical habitat
Eastern Puma *Puma (Felis) concolor* couguar)	Endangered
Birds	
Bald Eagle *(Haliaeetus leucocephalus)*	Threatened
Red-cockaded Woodpecker *(Picoides borealis)*	Endangered

APPENDIX B RELEVANT BASELINE REGULATIONS		
Regulation	**Description**	**Units Potentially Affected**
Tennessee Scenic Rivers Act 1968	Management of Tennessee Natural Resource Areas limits development to a few basic facilities (i.e., picnic areas, visitors centers, etc.) Outstanding Natural Resource Waters include the Obed River and the Big South Fork of the Cumberland River.[224]	Unit 1 Duck River, Unit 3 Obed River, Unit 9 Big South Fork
Tennessee Scenic Rivers Program	Established in 1968 with the passage of the Tennessee Scenic River Act, this program seeks to preserve valuable selections of rivers in their free-flow natural or scenic conditions and to protect water quality and adjacent lands. Protections afforded to the river habitat include road development control, water level control, erosion control, and vegetation and wildlife management.[225]	Unit 1 Duck River
Tennessee Water Quality Control Act of 1977	Authorizes the Tennessee Water Control Board to require permit applicants to evaluate practicable alternatives and conduct avoidance, minimization, and/or mitigation for activities impacting water. The current policy is that of "no net loss;" if mitigation is sufficient to offset the proposed loss, issuance of a permit is allowed under the Act.[226]	Unit 1 Duck River, Unit 3 Obed River, Unit 9 Big South Fork, Unit 6 Nolichucky River, Unit 7 Beech Creek, Unit 5 Clinch River, Unit 4 Powell River
Tennessee Water Quality Standards	Authorized by the Tennessee Water Quality Control Act of 1977, the Tennessee Division of Water Pollution Control implements and enforces State water quality standards. Water quality objectives include abating existing pollution of Tennessee waters, reclaiming polluting waters, preventing the future pollution of waters, and planning for the future use of State waters.[227]	Unit 1 Duck River, Unit 3 Obed River, Unit 9 Big South Fork, Unit 6 Nolichucky River, Unit 7 Beech Creek, Unit 5 Clinch River, Unit 4 Powell River
Tennessee Antidegradation Statement	The purpose of the antidegradation statement is to protect existing uses of surface waters, including high quality surface waters.[228]	Unit 1 Duck River, Unit 3 Obed River, Unit 9 Big South Fork, Unit 6 Nolichucky River, Unit 7 Beech Creek, Unit 5 Clinch River, Unit 4 Powell River

[224] Tennessee Code Ann., §11-13-101 (1968).

[225] Rules of Tennessee Department of Conservation, Division of State Parks, §0400-2-8, *Management of Tennessee Natural Resource Areas.*

[226] Tennessee Code Ann., §69-3-101.

[227] Tennessee Code Ann., §69-3-101.

[228] Tennessee. Code Ann., Chapter 1200-4-3-.06.

APPENDIX B RELEVANT BASELINE REGULATIONS		
Regulation	**Description**	**Units Potentially Affected**
Virginia State Water Control Law	Protects existing high-quality State waters and provides for the restoration of all other State waters so they will support the growth of aquatic life. Also, numeric limits for specific physical, chemical, biological, and radiological characteristics of water for the propagation and growth of aquatic life are prescribed.[229]	Unit 5 Clinch River, Unit 4 Powell River
Virginia Scenic Rivers System	The Department of Conservation and Recreation reviews and make recommendations regarding planning and development of water and related land resources, including the construction of impoundments, diversions, roadways, crossings, channels, locks, canals, or other uses which alter the character of a waterway or destroy its scenic values, full consideration and evaluation of the river as a scenic resource will be given before plans are approved.[230]	Unit 5 Clinch River
Virginia Erosion and Sediment Control Program	The program's goal is to control soil erosion, sedimentation, and nonagricultural runoff from regulated "land-disturbing activities" to prevent degradation of property and natural resources. Regulations specify "Minimum Standards," which include criteria, techniques and policies, that must be followed on all regulated activities. Some exemptions exist for specific land use activities.[231]	Unit 5 Clinch River, Unit 4 Powell River
Kentucky Water Quality Law	Waters of the Commonwealth will be conserved for the propagation of fish and aquatic life.[232]	Unit 10 Buck Creek, Unit 8 Rock Creek, Unit 11 Sinking Creek, Unit 12 Marsh Creek, Unit 9 Big South Fork
Kentucky Wild Rivers Act 1972	Surface mining, clear-cutting, dam construction, and other in-stream disturbance activities are prohibited with in a wild river corridor. Existing development and agricultural land uses are allowed to continue but any developments which may impair water quality or the rivers natural condition are regulated. Management plans are required for all wild rivers.[233]	Unit 8 Rock Creek, Unit 9 Big South Fork

[229] Virginia Code Ann., §62.1-44.15(3a).

[230] Virginia Code Ann., §10.1.402.

[231] Virginia Code Ann., §10.1-561.

[232] Kentucky Revised Statutes §401.5:002-031.

[233] Kentucky Revised Statutes §146.200 to §146.350.

APPENDIX B RELEVANT BASELINE REGULATIONS		
Regulation	**Description**	**Units Potentially Affected**
Kentucky Outstanding Resource Waters	Although these waters may receive industrial and/or municipal discharges these discharges must receive a Kentucky Pollutant Discharge Elimination System (KPDES) permit. Special conditions are provided in the KPDES permit limit projects that would have a harmful effect on listed species.[234]	Unit 10 Buck Creek, Unit 12 Marsh Creek, Unit 11 Sinking Creek
Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters	Mississippi water quality standards establish criteria necessary to protect, upgrade, and enhance water quality in Mississippi. General conditions applicable to all State waters include: State waters should be free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended solids, or other conditions in such a degree to degrade waters and impact public health, recreation, aquatic life and wildlife. Specifically, criteria for aquatic life use includes standards for toxicity , bacteria, dissolved solids, and phenolic compounds levels.[235]	Unit 2 Bear Creek
Mississippi State Water Management Plan	Under authority of Mississippi Legislature the Office of Land and Water Resources of the Mississippi Department of Environmental Quality (MDEQ) is responsible for development and oversight of the "State water management plan." This plan was developed in order to control the effects of development on the waters of the State through a water withdrawal permitting system and thorough study and reporting regarding: water resources of the State; methods of conserving and augmenting such waters; existing and contemplated needs and uses for protection and procreation of fish and wildlife and various other uses; and drainage, reclamation, flood-plain or flood-hazard area zoning, and selection of reservoir sites.[236]	Unit 2 Bear Creek

[234] Kentucy Administrative Record §401.5:301 §7.

[235] State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters, Adopted November 16, 1995.

[236] Mississippi. Code. Ann, §51-3-1 through §51-3-5.

APPENDIX B RELEVANT BASELINE REGULATIONS		
Regulation	**Description**	**Units Potentially Affected**
Alabama Water Pollution Control Act	This Act authorizes the Alabama Department of Environmental Management (ADEM) to establish and enforce water quality standards, regulations, and penalties in order to implement both State and federal water quality regulations. ADEM administrative code prohibits the deposition of pollutants, including sediment, organic materials, and pesticides into State waters. For non-source pollutants, provisions are limited to recommending best management practices adequate to protect water quality consistent with the ADEM's nonpoint source control program (see below).[237]	Unit 2 Bear Creek
Alabama Nonpoint Source Program: Alabama Clean Water Partnership	Established in 1987, Alabama's Nonpoint Source Program relies on best management practices, education and outreach, monitoring and assessments, and resource assistance to meet the goals of the Clean Water Act. The Alabama Clean Water Partnership, a key component of the program, consists of joint voluntary efforts of public and private stakeholders who strive to restore and protect Alabama's river basins. The Bear Creek Watershed Project began in 2000.[238]	Unit 2 Bear Creek
Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974	Prohibits the taking, possession, transportation, exportation, processing, sale or offer for sale or shipment within Tennessee of endangered fish and wildlife unless such actions will assist in preservation or propagation of the species or subspecies.[239]	Unit 1 Duck River, Unit 3 Obed River, Unit 9 Big South Fork, Unit 6 Nolichucky River, Unit 7 Beech Creek, Unit 5 Clinch River, Unit 4 Powell River
Tennessee Endangered Species	The Environmental Review Program reviews State and Federal permit application for potential impacts to listed species and recommends ways to avoid or mitigate impacts. Each of the five mussels are listed as endangered by the Tennessee Wildlife Resources Agency.[240]	Unit 1 Duck River, Unit 3 Obed River, Unit 9 Big South Fork, Unit 6 Nolichucky River, Unit 7 Beech Creek, Unit 5 Clinch River, Unit 4 Powell River

[237] Alabama Department of Environmental Management, Water Division, Water Quality Program, Administrative Code, §335-6-11.

[238] Alabama Department of Environmental Management, *Alabama's Nonpoint Source Management Program 2001 Annual Report.*

[239] Tennessee Code Ann., §70-8-101 through §70-8-112 (1974).

[240] Tennessee Department of Environment and Conservation, Division of Natural Heritage, Environmental Review Program at http://www.state.tn.us/environment/nh/erp.htm as viewed on March 10, 2003.

APPENDIX B RELEVANT BASELINE REGULATIONS		
Regulation	**Description**	**Units Potentially Affected**
Virginia's Endangered Species Act	Prohibits the taking, transportation, sale, etc. of endangered and threatened species (except as permitted) and provides for listing and recovery of these species.[241]	Unit 5 Clinch River, Unit 4 Powell River
Kentucky Endangered Species	Allows the Kentucky Department of Fish and Wildlife Resources to list threatened and endangered species.[242]	Unit 10 Buck Creek, Unit 8 Rock Creek, Unit 11 Sinking Creek, Unit 12 Marsh Creek, Unit 9 Big South Fork
Mississippi Nongame and Endangered Species Conservation Act	This Act prohibits the taking, possession, transportation, exportation, processing, sale, or shipment within the State of endangered species. Pursuant to this Act, the Mississippi Commission on Wildlife, Fisheries and Parks shall issue regulations establishing limitations related to taking, possession, transportation, and sale of species as necessary to protect the species.[243]	Unit 2 Bear Creek
Alabama Nongame Species Regulation	Prohibits the take, capture, killing, or attempt to take, capture or kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value for listed species.[244]	Unit 2 Bear Creek
Alabama Mussel Harvest Restrictions	The Alabama Division of Wildlife and Freshwater Fisheries prescribes mussel harvesting methods for commercial mussels, which include prohibitions on the harvesting of federally listed threatened and endangered mussels.[245]	Unit 2 Bear Creek
Kentucky Forest Conservation Act	Provides guidelines for the harvest of timber in Kentucky. The focus of the Act is the protection of water quality. The Act requires the implementation of best management practices, and logger education.[246]	Unit 13 Laurel Fork, Unit 9 Big South Fork

[241] Virginia Code Ann., §29.1-564-568.

[242] Kentucky Revised Statutes §146.600 through 146.619.

[243] Mississippi Code Ann., §49-5-101 through 49-5-119.

[244] Code of Alabama, §220-2-92.

[245] Alabama Wildlife & Freshwater Fisheries, *Alabama Regulations Relating to Game, Fish, and Fur-bearing Animals, 2002-2003,* pp. 76.

[246] Kentucky Revised Statues. §149.330 to 149.355.

APPENDIX B RELEVANT BASELINE REGULATIONS		
Regulation	**Description**	**Units Potentially Affected**
Catoosa Wildlife Management Area	Catoosa is managed primarily for hunting. Use of off-road vehicles, horses and other saddle pack animals, camping, and fires are restricted in this 80,000 acre management area.[247]	Unit 3 Obed River

[247] Tennessee Code Ann.., Chapter 1660-1-14-.03 to .015.

APPENDIX C:

C.1 Potential Impacts on Small Entities

272. This analysis is intended to facilitate determination of whether this critical habitat designation potentially affects a "substantial number" of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses and governments likely to experience a "significant effect." In both tests, this analysis examines the total estimated section 7 costs calculated in earlier sections of this report, including those impacts that may be "attributable co-extensively" with the listing of the mussels. This results in a conservative estimate (i.e., more likely to overstate impacts than understate them), because it utilizes the upper bound impact estimate from the earlier analysis.

273. Federal courts and Congress have indicated that a Regulatory Flexibility Act/SBREFA analysis should be limited to direct and indirect impacts on entities subject to the requirements of the regulation. As such, entities indirectly impacted by the mussel listing and designation of critical habitat, and, therefore, not directly regulated by the listing or critical habitat designation, are not considered in this screening analysis.

Identifying Activities That May Involve Small Entities

274. Section 3 of this report identifies activities that are within, or will otherwise be affected by, section 7 of the Act for the mussels. Third parties are not involved in several of the activities potentially affected by section 7 implementation for the mussels (i.e. only the Action agency and the Service are involved in the consultation). Of the remaining activities potentially affected by section 7 implementation for the mussels and involving a third party, many have no directly-regulated small businesses or governments involvement. Private entities are forecast to incur 22 percent of the administrative costs of section 7, and no project modification costs. State and local governments are expected to incur 21 percent of the administrative costs and 91 percent of the project modification costs. All of these project modification costs are associated with road and bridge construction and maintenance, and the costs are expected to be borne directly by or passed on to the Federal government. Thus, small entities should not be directly impacted by section 7 implementation for these affected projects:

- **Road and bridge construction and maintenance.** DOT consultations on bridge projects could lead to project modifications that include the relocation of mussels, increasing the span of the bridge, and construction and post construction monitoring. This analysis anticipates that most costs associated with project modification compliance will either be borne directly by or passed on to the Federal government, which accordingly will ultimately bear the majority of the costs of these modifications.

- **Agricultural activities (Natural Resources Conservation Service, Army**

Corps of Engineers, Tennessee Valley Authority). Both formal and informal consultations are anticipated involving agricultural activities (such as stream bank stabilization, road construction, stream crossings, and wildlife management). Project modifications may include equipment restrictions, requirements to work outside the stream bed, and the use of natural materials. Any project modification costs associated with these consultations are expected to be minimal.

- **Utilities construction and maintenance.** Utilities consultations may result in project modifications that include rerouting, and mussel relocation. TVA anticipates additional review costs associated with their transmission line activities. This analysis anticipates that most costs associated with project modification compliance will either be borne directly by or passed on to the Federal government, which accordingly will ultimately bear the majority of the costs of these modifications.

- **Activities in National Forests (Forest Service)**. These may include recreation activities, timber, and land activities. These activities are anticipated to be carried out by the Forest Service.

- **National Parks, Wild and Scenic Rivers, and National River and Recreation Areas (National Park Service)**. Consultations with the National Park Service will be regarding river crossing projects such as bridge construction, the park's General Management Plan, and trail maintenance. The river crossing project may result in project modifications such as mussel relocation or termination of the project. This analysis anticipates that costs associated with project modification compliance will either be borne directly by or passed on to the Federal government.

- **Coal mining (Office of Surface Mining, National Park Service)**. Consultations are anticipated involving mining activities. Project modifications may include the installation of additional sumps along haul roads to handle sediment loads, the construction of larger sediment basins (holding ponds), or more frequent clean-out of ponds and haul road sumps. Any project modification costs associated with these activities are expected to be minimal.

- **Gravel dredging and excavation (Army Corps of Engineers)**. Consultations are anticipated involving gravel dredging and excavation projects but these consultations are not expected to result in any project modifications.

- **Oil and gas development (National Park Service)**. Informal consultations are anticipated involving oil and gas development projects but no project modifications are expected.

- **Power plants (Army Corps of Engineers)**. There are no consultations

expected involving power plants. The third parties that would be involved in any power plant consultations are the American Electric Power company and CME North American Merchant Energy, LLC. However, both companies report megawatt hour sales in excess of the SBA threshold of 4 million megawatt hours.[248]

- **Dams/Reservoirs (Tennessee Valley Authority)**. There are no consultations expected involving dams or reservoirs. No third parties would be involved in any dam or reservoir consultations since the only dams or reservoir that could potentially be impacted by the designation are Tennessee Valley Authority, a Federal agency, installations.

- **Water quality activities (Environmental Protection Agency).** Environmental Protection Agency conducts activities to protect water quality under the CWA. These may include EPA review of TMDL levels with States and review of State water quality standards.

- **Conservation and recreation (Fish and Wildlife Service, Tennessee Valley Authority and Army Corps of Engineers).** As stated in Section 4 of this analysis, the Service's conservation and recreation projects are designed to benefit the mussels and habitat, and are generally carried out by the Service themselves. Therefore, small entities should not be affected by consultations on these activities. Third parties may be impacted by consultations regarding recreation projects, however, project modifications are not anticipated.

- After excluding the consultations on activities above from the total universe of potential impacts identified in the body of the analysis, no consultations and Action agencies remain. The above actions feature activities that do *not* directly regulate small entities.

C.2 Potential Impacts to the Energy Industry

275. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal

[248] "Hydroelectric power generation" is identified by NAICS code #221111. U.S. Small Business Administration, "Small Business Size Standards matched to North American Industry Classification System (NAICS)," accessed at http://www.sba.gov/size/sizetable2002.html on March 14, 2003. A firm is small if, including its affiliates, it is primarily engaged in the generation, transmission, and/or distribution of electric energy for sale and its total electric output for the preceding fiscal year did not exceed four million megawatt hours.

Government's regulations on the supply, distribution, and use of energy."[249] The Office of Management and Budget has provided guidance for implementing this executive order that outlines nine outcomes that may constitute "a significant adverse effect" when compared without the regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
- Reductions in fuel production in excess of 4,000 bbls per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million Mcf per year;
- Reductions in electricity production in excess of 1 billion kilowatts per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.[250]

276. Five of these criteria are relevant to this analysis: 1) potential reductions in crude oil supply; 2) potential reductions in coal production; 3) potential reductions in natural gas production; 4) potential increases in the cost of energy production; and 5) potential increases in the cost of energy distribution.

Evaluation of Whether Section 7 Implementation will Result in Reductions in Crude Oil Supply, Coal Production, and Natural Gas Production

277. Section 7 consultations with respect to oil, gas, and coal operations are anticipated to occur within four Tennessee counties containing proposed critical habitat for the mussels; Cumberland, Fentress, Morgan, and Scott Counties.[251] Exhibit C-1, C-2, and C-3 provide an analysis of whether the energy industry, specifically, crude oil, natural gas, and coal producers are likely to experience "a significant adverse effect" as a result of section 7 implementation for the mussels.

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[249] Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, accessed at http://www.whitehouse.gov/omb/memoranda/m01-27.html

[250] Ibid.

[251] While other counties in Virginia, Kentucky, and Tennessee have oil and gas drilling and coal mining activities they are not included in this analysis. For these counties the costs associated with technical assistance efforts and consultations with no recommended project modifications are unlikely to cause the abandonment of the projects, and they are unlikely to lead to changes in energy production or distribution.

Exhibit C-1

HISTORIC CRUDE OIL PRODUCTION
(FENTRESS, MORGAN, AND SCOTT COUNTIES, TENNESSEE, AND MCCREARY COUNTY, KENTUCKY), bbls (barrels)

Year	McCreary County	Fentress County	Morgan County	Scott County	Total bbls	Total bbls/day
1997	1,457	29,193	65,585	69,198	165,433	453
1998	2,365	25,973	50,870	60,340	139,548	382
1999	3,850	26,603	55,275	63,420	149,148	409
2000	3,998	14,114	35,259	49,758	103,129	283
2001	5,702	31,920	45,147	48,683	131,452	360
Average	3,475	25,561	50,427	58,280	137,742	377

Source: Brandon Nuttall, Kentucky Geological Survey, Lexington, Kentucky. Data source: Kentucky Revenue Cabinet, Severance Tax Division.
Oil and Gas Activity in Tennessee During 1997, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.
Oil and Gas Activity in Tennessee During 1998, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.
Tennessee Statistical Energy Data, Energy Division, Tennessee Department of Economic & Community Development, Nashville, Tennessee.
Oil and Gas Activity in Tennessee During 2000, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.
Oil and Gas Activity in Tennessee During 2001, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.

278. As Exhibit C-1 illustrates, the Tennessee and Kentucky counties containing proposed critical habitat collectively produce less than 500 bbls of crude oil on a daily basis.[252] Therefore, should section 7 implementation cause the abandonment of future development of 35 to 50 oil wells within McCreary, Fentress, Morgan or Scott counties, it is unlikely that crude oil supply will drop by more than the threshold of 10,000 bbls per day. In fact, the entire States of Kentucky and Tennessee, together, produce less oil than the 10,000 bbls threshold (Kentucky produced 7,671 bbls per

[252] In 2001, Tennessee ranked 27th in oil production out of 31 oil producing States. The State produced approximately 350,000 bbls of oil, less than two one-hundredths of total U.S. oil production in 2001 (2,117,511,000 bbls). In 2001, Kentucky ranked 20th in oil production out of 31 oil producing States. The State produced approximately 3 million bbls of oil, or less than two-tenths of the total U.S. oil production in 2001 (2,117,511,000 bbls). Energy Information Administration. Production of Crude Oil by State, 2001. Accessed at http://www/eia.doe.gov/neic/rankings/crudebystate.htm on June 4, 2003.

day in 2001 and Tennessee produced 1,059 bbls per day).[253]

Exhibit C-2

HISTORIC NATURAL GAS PRODUCTION
(FENTRESS, MORGAN, AND SCOTT COUNTIES, TENNESSEE,
AND MCCREARY COUNTY, KENTUCKY), Mcf (thousand cubic feet)

Year	McCreary County	Fentress County	Morgan County	Scott County	Total Mcf	Total Million Mcf
1997	22,340	64,401	301,328	331,072	719,141	0.7
1998	43,263	75,408	289,483	314,213	722,367	0.7
1999	139,950	62,494	298,609	335,990	837,043	0.8
2000	217,974	55,018	277,140	307,739	857,871	0.9
2001	229,874	46,422	280,191	245,831	802,318	0.8
Average	130,680	60,749	289,350	306,969	787,748	0.8

Source: Brandon Nuttall, Kentucky Geological Survey, Lexington, Kentucky. Data source: Kentucky Revenue Cabinet, Severance Tax Division.
Oil and Gas Activity in Tennessee During 1997, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.
Oil and Gas Activity in Tennessee During 1998, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.
Tennessee Statistical Energy Data, Energy Division, Tennessee Department of Economic & Community Development, Nashville, Tennessee.
Oil and Gas Activity in Tennessee During 2000, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.
Oil and Gas Activity in Tennessee During 2001, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee.

279. As Exhibit C-2 illustrates, the Tennessee and Kentucky counties containing proposed critical habitat collectively produce less than 0.8 million Mcf of natural gas on an annual basis.[254] Therefore, should section 7 implementation cause the abandonment of future development of 35 to 50 natural gas wells within McCreary, Fentress, Morgan or Scott counties, it is unlikely that natural gas production will decrease by more than the threshold of 25 million Mcf per year.

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[253] Oil and Gas Activity In Tennessee During 2001, by Ronald P. Zurawski, State Geologist and Director, Tennessee Division of Geology, Nashville, Tennessee; Kentucky 2001 Oil Production. Accessed at: http://www.uky.edu/KGS/emsweb/data/2001/oilinfo2k1.html

[254] In 2001, Tennessee ranked 24th in natural gas production out of 32 natural gas producing States. The State produced approximately 2 million Mcf of natural gas, about one one-hundreth of total U.S. natural gas production in 2001 (20,656,358,000 Mcf). In 2001, Kentucky ranked 18th in natural gas production out of 32 natural gas producing States. The State produced approximately 82 million Mcf of natural gas, or about four-tenths of the total U.S. natural gas production in 2001 (20,656,358,000 Mcf). Energy Information Administration, Natural Gas Annual 2001. Accessed at: http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/natural_gas_monthly/current/pdf/table_07.pdf, June 4, 2003.

Exhibit C-3

HISTORIC COAL PRODUCTION (CUMBERLAND, FENTRESS, MORGAN, AND SCOTT COUNTIES, TENNESSEE), thousand short tons

Year	Cumberland County	Fentress County	Morgan County	Scott County	Total thousand short tons	Total tons
1997	0	288	56	108	452	452,000
1998	86	211	11	47	355	355,000
1999	256	3	8	168	435	435,000
2000	265	12	31	59	367	367,000
2001	268	83	0	22	373	373,000
Average	175	119	21	81	396	396,400

Source: Coal Production and Number of Mines by State, County, and Mine Type, 2001, accessed at http://www.eia.doe.gov/cneaf/coal/page/acr/table2.html.
Coal Industry Annual 1997, 1998, 1999, and 2000. Energy Information Administration, Office of Coal, Nuclear, Electric and alternative fuels, US Department of Energy, accessed at http://tonto.eia.doe.gov/FTPROOT/coal/058497.pdf, http://tonto.eia.doe.gov/FTPROOT/coal/058498.pdf, http://tonto.eia.doe.gov/FTPROOT/coal/058498.pdf, and http://tonto.eia.doe.gov/FTPROOT/coal/05842000.pdf

280. As Exhibit C-3 illustrates, the Tennessee counties containing proposed critical habitat collectively produce approximately 0.4 million tons of coal on an annual basis. Therefore, should section 7 implementation cause the abandonment of future development of any two mines within Cumberland, Fentress, Morgan or Scott County, it is unlikely that coal production will decrease by more than the threshold of 5 million tons per year. In fact, the entire State of Tennessee produces less coal than the 5 million ton threshold (the State produced 3.3 million tons in 2001).[255]

Evaluation of Whether Section 7 Implementation will Result in an Increase in the Cost of Energy Production in Excess of One Percent

281. Implementation of section 7 of the Act is not anticipated to result in an increase in the cost of energy production as no new hydroelectric dams or power plants or consultations associated with power plant or hydroelectric dam operations are anticipated on any of the critical habitat units or areas essential to the conservation of the mussels during the next ten years. Thus, hydroelectric and power plant operators are not expected to bear administrative and project modification costs that may impact revenues and/or output, and subsequently result in an increase in the cost of energy production.

[255] Coal Production and Number of Mines by State, County, and Mine Type, 2001, found at http://www.eia.doe.gov/cneaf/coal/page/acr/table2.html

Evaluation of Whether Section 7 Implementation will Result in an Increase in the Cost of Energy Distribution in Excess of One Percent

282. As described in Section 4.2.11, TVA anticipates 38 informal consultations on transmission line construction and maintenance with respect to the mussels during the next ten years The total administrative costs incurred by TVA as a result of section 7 implementation are $35,000, while costs associated with project modifications are anticipated to total $38,000. In 2002, total operating expenses for TVA were $5.2 billion.[256] Thus, the total costs incurred by TVA as a result of section 7 over ten years ($73,000) are less than one ten-thousandth of one percent of TVAs operating expenses. The impact to energy distribution is therefore not anticipated to exceed the one percent threshold.

Summary

283. Even in the worst case scenario, reductions in the production of crude oil, coal, or natural gas, and increases in the cost of energy production and distribution resulting from the implementation of section 7 for the mussels are not expected to have a "significant adverse effect," as defined by the Office of Management and Budget, on the supply, distribution, or use of energy.

[256] Tennesee Valley Authority. 2002. 2002 Annual Report, accessed at http://www.tva.com/finance/reports/pdf/fy2002ar.pdf

C.3 Unfunded Mandates Analysis

284. Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of UMRA, the Service must prepare a written statement, including a cost-benefit analysis, for significant regulatory actions that include a Federal mandate resulting in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.[257] Federal rules are exempt from the UMRA requirements if: (1) the rule implements requirements specifically set forth in law; or (2) compliance with the rule is voluntary for State and local governmental entities. Although the designation of critical habitat is required by the Act, the Secretary has discretion in designating specific geographic areas. Therefore, these two criteria are not met.

285. If a written statement is needed, section 205 of UMRA requires the Service to identify and consider a reasonable number of regulatory alternatives.[258] The Service must adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule, unless the Secretary publishes an explanation why that alternative was not adopted. These requirements apply to both proposed and final rules.

286. This analysis first determines whether written statement is required, based on the criteria set forth by UMRA. If such a statement is needed, section 202 of UMRA provides specific direction regarding the contents of the cost-benefit analysis that must accompany such a statement.[259] This analysis describes and discusses each of the types of costs that must be addressed.

287. Exhibit C-4 highlights the subset of costs of critical habitat designation that are anticipated to be borne by State and local governments. No impacts to tribal governments are expected as a result of this rule. These costs are comprised of administrative and project modification costs for road and bridge maintenance, utility construction and maintenance, water quality development and permitting activities. These costs also include 20 percent of the technical assistance efforts estimated by

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[257] 2 USC 1532.

[258] UMRA includes several other requirements that may pertain to this rulemaking. Section 203 requires the Service to develop a Small Government Agency Plan for any rule that may significantly or uniquely affect small governments, regardless of whether the rule exceeds the $100 million thresholds (i.e., thresholds for governments or the public sector) (2 USC 1533). In addition, section 204 requires the Service to develop an effective process that allows for meaningful and timely input during regulatory development by State, local, and tribal governments (2 USC 1534). The Service's compliance with these requirements is addressed separately from this analysis.

[259] 2 USC 1532.

the Service for various activities.[260]

Exhibit C-4 ECONOMIC IMPACTS OF CRITICAL HABITAT DESIGNATION FOR THE MUSSELS ON STATE AND LOCAL GOVERNMENTS	
Nominal value of costs	$5,717,900
Present value of costs (discounted at 7 percent)	$4,016,000
Annualized	$571,800

288. Exhibit C-5 highlights the subset of costs of critical habitat designation that are anticipated to be borne by private entities, such as privately-owned utility companies and individual parties. These costs are comprised of administrative and project modification costs for utilities, agricultural activities, coal mining, gravel dredging, oil and gas drilling, and conservation and recreation projects on private lands. The measured economic impact also includes the cost of technical assistance to private landowners, roughly 60 percent of the technical assistance efforts estimated by the Service for various activities.[261]

Exhibit C-5 ECONOMIC IMPACTS OF CRITICAL HABITAT DESIGNATION FOR THE MUSSELS ON PRIVATE ENTITIES	
Nominal value of costs	$2,836,500
Present value of costs (discounted at 7 percent)	$1,992,300
Annualized	$283,700

289. As demonstrated in Exhibits C-4 and C-5 neither State and local governments nor private entities are anticipated to bear more than $100 million annually. State and local governments may expect costs of approximately $600,000 per year over the next ten years, and private entities may experience costs of approximately $300,000 per year over the next ten years. This analysis uses an annualization of total costs to represent the average anticipated costs in any one year because in many cases the exact year in which consultations regarding these activities will occur is unknown. As a result of this uncertainty, this analysis assumes that the costs of these activities

[260] Personal communication with Service Biologists, Cookeville Field Office, Fish and Wildlife Service, June 2, 2003.

[261] Ibid.

are spread evenly throughout the ten year time frame.

290. Based on the criteria set forth by UMRA, the cost of designation of critical habitat for the mussels to the private sector will not exceed $100 million annually. Therefore, no written statement is required, and no additional analysis is necessary.

APPENDIX D:

SECTION 7 AND TECHNICAL ASSISTANCE COSTS FOR THE MUSSELS BY UNIT AND ACTIVITY

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
1- Duck River	Road and Bridge Construction (TDOT)	5 Formal Consultations	Low	$3,800	$19,500	$47,500	$9,000	$79,800
			High	$22,700	$32,500	$53,500	$75,000	$184,000
	Road and Bridge Construction (TDOT)	7 - 19 Informal Consultations	Low	$210	$9,100	$8,400	$12,600	$30,300
			High	$3,610	$74,100	$181,000	$285,000	$543,000
	Road and Bridge Construction (USACE)	2 Informal Consultations	Low	$60	$2,600	$2,400	$0	$5,060
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (USACE/TVA)	2 Informal Consultations	Low	$60	$2,600	$2,400	$0	$5,060
			High	$380	$7,800	$19,000	$0	$27,200
	Gravel Dredging (USACE)	2 - 5 Informal Consultations	Low	$60	$2,600	$2,400	$0	$5,060
			High	$950	$19,500	$47,500	$0	$68,000
	Utilities (USACE)	1 - 2 Formal Consultations	Low	$760	$3,900	$9,500	$0	$14,200
			High	$9,080	$13,000	$21,400	$0	$43,500
	Utilities (USACE)	4 - 8 Informal Consultations	Low	$120	$5,200	$4,800	$0	$10,100
			High	$1,520	$31,200	$76,000	$0	$109,000
	Utilities (TVA)	6 Informal Consultations	Low	$180	$7,800	$0	$6,000	$14,000
			High	$180	$7,800	$0	$6,000	$14,000
	Conservation/ Recreation (TVA)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
			High	$380	$7,800	$19,000	$0	$27,200
	Conservation/ Recreation (FWS)	6 Informal Consultations	Low	$180	$0	$0	$0	$180
			High	$1,140	$0	$0	$0	$1,140
	Water Quality Activities (USEPA)	2 Formal Consultations	Low	$1,520	$7,800	$11,800	$0	$21,100
			High	$9,080	$13,000	$33,400	$0	$55,500
	NPDES Permit Review	3 Technical Assistance Efforts	Low	$30	$0	$1,800	$0	$1,830
			High	$30	$0	$4,500	$0	$4,530
2- Bear Creek	Road and Bridge Construction (MS FHWA)	1 Informal Consultation	Low	$30	$1,300	$1,200	$102,000	$104,000
			High	$190	$3,900	$9,500	$115,000	$129,000
	Road and Bridge Construction (AL DOT)	2 Informal Consultations	Low	$60	$2,600	$2,400	$204,000	$209,000
			High	$380	$7,800	$19,000	$230,000	$257,000
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (TVA/USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Utilities (TVA)	4 Informal Consultations	Low	$120	$5,200	$0	$4,000	$9,320
			High	$120	$5,200	$0	$4,000	$9,320
	Conservation/ Recreation (TVA)	1 Formal Consultation	Low	$760	$3,900	$9,500	$0	$14,200

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
			High	$4,540	$6,500	$10,700	$0	$21,700
	Conservation/ Recreation (TVA)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600
	Water Quality Activities (USEPA)	1 Formal Consultation	Low	$760	$3,900	$5,900	$0	$10,600
			High	$4,540	$6,500	$16,700	$0	$27,700
	NPDES Permit Review	12 - 32 Technical Assistance Efforts	Low	$120	$0	$7,200	$0	$7,320
			High	$320	$0	$48,000	$0	$48,300
3- Obed River	Road and Bridge Construction (TDOT)	1 - 2 Formal Consultations	Low	$760	$3,900	$9,500	$1,800	$16,000
			High	$9,080	$13,000	$21,400	$30,000	$73,500
	Road and Bridge Construction (TDOT)	6 - 7 Informal Consultations	Low	$180	$7,800	$7,200	$10,800	$26,000
			High	$1,330	$27,300	$66,500	$105,000	$100,000
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (NRCS)	20 - 30 Informal Consultations	Low	$1,240	$62,800	$32,800	$0	$94,800
			High	$1,860	$94,200	$46,200	$0	$142,000
	National Park Activities (NPS)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$30	$1,300	$1,200	$0	$2,530
	Coal Mining (OSM)	0 - 3 Informal Consultations	Low	$0	$0	$0	$0	$0
			High	$250	$6,500	$11,900	$0	$18,700
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
			High	$380	$7,800	$19,000	$0	$27,200
	Conservation/ Recreation (FWS)	3 Informal Consultations	Low	$90	$0	$0	$0	$90
			High	$570	$0	$0	$0	$570
4- Powell River	Road and Bridge Construction (TDOT)	0 - 4 Informal Consultations	Low	$0	$0	$0	$0	$0
			High	$760	$15,600	$3,800	$60,000	$114,000
	Road and Bridge Construction (VDOT)	17 Formal Consultations	Low	$12,900	$66,300	$216,000	$230,000	$525,000
			High	$77,200	$111,000	$236,000	$230,000	$653,000
	Road and Bridge Construction (USACE)	1 Formal Consultation	Low	$760	$3,900	$9,500	$0	$14,200
			High	$4,540	$6,500	$10,700	$0	$21,700
	Road and Bridge Construction (USACE)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600
	Agriculture (NRCS)	10 Informal Consultations	Low	$620	$31,400	$15,400	$0	$47,400
			High	$620	$31,400	$15,400	$0	$47,400
	Agriculture (TVA/USACE)	3 - 5 Informal Consultations	Low	$90	$3,900	$3,600	$0	$7,590
			High	$950	$19,500	$47,500	$0	$68,000
	Utilities (USACE)	0 - 1 Formal Consultation	Low	$0	$0	$0	$0	$0
			High	$4,540	$6,500	$10,700	$0	$21,700
	Utilities (USACE)	16 Informal Consultations	Low	$480	$20,800	$19,200	$0	$40,500
			High	$3,040	$62,400	$152,000	$0	$217,000

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Conservation/ Recreation (FWS)	4 Informal Consultations	Low	$120	$0	$0	$0	$120
			High	$760	$0	$0	$0	$760
	Conservation/ Recreation (TVA)	6 Informal Consultations	Low	$180	$7,800	$7,200	$0	$15,200
			High	$1,140	$23,400	$57,000	$0	$81,500
	NPDES Permit Review	5 - 9 Technical Assistance Efforts	Low	$50	$0	$3,000	$0	$3,050
			High	$90	$0	$13,500	$0	$13,600
5- Clinch River	Road and Bridge Construction (TDOT)	0 - 2 Informal Consultations	Low	$0	$0	$0	$0	$0
			High	$380	$7,800	$19,000	$30,000	$57,200
	Road and Bridge Construction (VDOT)	11 Formal Consultations	Low	$8,360	$42,900	$140,000	$149,000	$340,000
			High	$50,000	$71,500	$153,000	$149,000	$423,000
	Road and Bridge Construction (USACE)	1 Formal Consultation	Low	$760	$3,900	$9,500	$0	$14,200
			High	$4,540	$6,500	$10,700	$0	$21,700
	Road and Bridge Construction (USACE)	0 - 1 Informal Consultation	Low	$0	$0	$0	$0	$0
			High	$190	$3,900	$9,500	$0	$13,600
	Agriculture (NRCS)	20 - 25 Informal Consultations	Low	$1,240	$62,800	$30,800	$0	$94,800
			High	$1,550	$78,500	$38,500	$0	$119,000
	Agriculture (TVA/USACE)	3 - 5 Informal Consultations	Low	$90	$3,900	$3,600	$0	$7,590
			High	$950	$19,500	$47,500	$0	$68,000
	Coal Mining Permit Review	300 Technical Assistance Efforts	Low	$3,000	$0	$180,000	$0	$183,000
			High	$3,000	$0	$450,000	$0	$453,000

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Utilities (USACE)	0 - 1 Formal Consultations	Low	$0	$0	$0	$0	$0
			High	$4,540	$6,500	$10,700	$0	$21,700
	Utilities (USACE)	16 Informal Consultations	Low	$480	$20,800	$19,200	$0	$40,500
			High	$3,040	$62,400	$152,000	$0	$217,000
	Utilities (TVA)	6 Informal Consultations	Low	$180	$7,800	$0	$6,000	$14,000
			High	$180	$7,800	$0	$6,000	$14,000
	Conservation/ Recreation (TVA)	12 - 17 Informal Consultations	Low	$360	$15,600	$14,400	$0	$30,400
			High	$3,770	$66,300	$162,000	$0	$231,000
	Conservation/ Recreation (FWS)	2 Informal Consultations	Low	$60	$0	$0	$0	$60
			High	$380	$0	$0	$0	$380
	Water Quality (USEPA)	1 Formal Consultation	Low	$760	$3,900	$5,900	$0	$10,600
			High	$4,540	$6,500	$16,700	$0	$27,700
	NPDES Permit Review	3 - 6 Technical Assistance Efforts	Low	$30	$0	$1,800	$0	$1,830
			High	$60	$0	$9,000	$0	$9,060
6- Nolichucky River	Road and Bridge Construction (TDOT)	0 - 2 Informal Consultations	Low	$0	$0	$0	$0	$0
			High	$380	$7,800	$19,000	$30,000	$51,200
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Conservation/ Recreation (TVA)	2 - 4 Informal Consultations	Low	$60	$2,600	$2,400	$0	$5,060
			High	$760	$15,600	$38,000	$0	$54,400
	Conservation/ Recreation (FWS)	6 Informal Consultations	Low	$180	$0	$0	$0	$180
			High	$1,140	$0	$0	$0	$1,140
	Water Quality (USEPA)	1 Formal Consultation	Low	$760	$3,900	$5,900	$0	$10,600
			High	$4,540	$6,500	$16,700	$0	$27,700
	NPDES Permit Review	1 Technical Assistance Effort	Low	$10	$0	$600	$0	$610
			High	$10	$0	$1,500	$0	$1,510
7- Beech Creek	Road and Bridge Construction (TDOT)	0 - 1 Informal Consultation	Low	$0	$0	$0	$0	$0
			High	$190	$3,900	$9,500	$15,000	$28,600
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (NRCS)	20 - 30 Informal Consultations	Low	$1,240	$62,800	$30,800	$0	$94,800
			High	$1,860	$94,200	$46,200	$0	$142,000
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Conservation/ Recreation (FWS)	1 Informal Consultation	Low	$30	$0	$0	$0	$30
			High	$190	$0	$0	$0	$190
8- Rock Creek	Road and Bridge Construction (USACE)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	National Forest Activities (USFS)	0 - 3 Formal Consultations	Low	$0	$0	$0	$0	$0
			High	$15,100	$63,700	$0	$0	$78,800
	National Forest Activities (USFS)	36 - 33 Informal Consultations	Low	$1,470	$185,000	$0	$0	$186,000
			High	$6,180	$536,000	$0	$0	$542,000
	Coal Mining	0 - 6 Technical Assistance Efforts	Low	$0	$0	$0	$0	$0
			High	$60	$0	$9,000	$0	$9,060
	Utilities (USACE)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600
	NPDES Permit Review	1 - 3 Technical Assistance Efforts	Low	$10	$0	$600	$0	$610
			High	$30	$0	$4,500	$0	$4,530
9- Big South Fork	Road and Bridge Construction (TDOT)	1 - 2 Formal Consultations	Low	$760	$3,900	$9,500	$1,800	$16,000
			High	$9,080	$13,000	$21,400	$30,000	$73,500
	Road and Bridge Construction (TDOT)	5 - 8 Informal Consultations	Low	$150	$6,500	$6,000	$9,000	$21,700
			High	$1,520	$31,200	$76,000	$120,000	$229,000
	Road and Bridge Construction (KTC)	3 Formal Consultations	Low	$2,280	$11,700	$28,500	$200,000	$242,000
			High	$13,600	$19,500	$32,100	$200,000	$365,000
	Road and Bridge Construction (USACE)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600
	National Park Activities (NPS)	1 Formal Consultation	Low	$760	$3,900	$9,500	$0	$14,200
			High	$4,540	$6,500	$10,700	$0	$21,700

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	National Park Activities (NPS)	7 Informal Consultations	Low	$210	$9,100	$8,400	$0	$17,700
			High	$1,330	$27,300	$66,500	$0	$95,100
	Coal Mining (OSM)	11 - 21 Informal Consultations	Low	$330	$14,300	$13,200	$0	$27,800
			High	$790	$39,900	$33,500	$0	$64,200
	Oil and Gas Development (NPS)	35 - 50 Informal Consultations	Low	$6,650	$368,000	$102,000	$0	$476,000
			High	$9,500	$525,000	$145,000	$0	$680,000
	Utilities (USACE)	1 Informal Consultation	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600
	Utilities (TVA)	4 Informal Consultations	Low	$120	$5,200	$0	$4,000	$9,320
			High	$120	$5,200	$0	$4,000	$9,320
	Conservation/ Recreation (USACE)	1 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$190	$3,900	$9,500	$0	$13,600
	NPDES Permit Review	1 Technical Assistance Effort	Low	$10	$0	$600	$0	$610
			High	$10	$0	$1,500	$0	$1,510
10- Buck Creek	Road and Bridge Construction (KTC)	1 Formal Consultation	Low	$760	$3,900	$9,500	$100,000	$114,000
			High	$4,540	$6,500	$10,700	$100,000	$122,000
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (NRCS)	2 - 4 Formal Consultations	Low	$1,520	$21,000	$5,800	$0	$28,300
			High	$18,200	$52,400	$16,400	$0	$87,000

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Agriculture (NRCS)	10 - 20 Informal Consultations	Low	$620	$31,400	$15,400	$0	$47,400
			High	$1,240	$62,800	$30,800	$0	$94,800
	Agriculture (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Gravel Dredging (USACE)	5 - 10 Formal Consultations	Low	$3,800	$19,500	$47,500	$0	$70,800
			High	$45,400	$65,000	$107,000	$0	$217,000
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Conservation/ Recreation (FWS)	4 Informal Consultations	Low	$120	$0	$0	$0	$120
			High	$760	$0	$0	$0	$120
	NPDES Permit Review	2 - 5 Technical Assistance Efforts	Low	$20	$0	$1,200	$0	$1,220
			High	$50	$0	$7,500	$0	$7,550
11- Sinking Creek	Road and Bridge Construction (KTC)	1 Formal Consultation	Low	$760	$3,900	$9,500	$100,000	$114,000
			High	$4,540	$6,500	$10,700	$100,000	$122,000
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (NRCS)	2 - 4 Formal Consultations	Low	$1,520	$21,000	$5,800	$0	$28,300
			High	$18,200	$52,400	$16,400	$0	$87,000
	Agriculture (NRCS)	8 - 15 Informal Consultations	Low	$496	$25,100	$12,300	$0	$37,900
			High	$930	$47,100	$23,100	$0	$71,100

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	National Forest Activities (USFS)	0 - 3 Formal Consultations	Low	$0	$0	$0	$0	$0
			High	$15,100	$63,700	$0	$0	$78,800
	National Forest Activities (USFS)	36 - 33 Informal Consultations	Low	$1,470	$185,000	$0	$0	$186,000
			High	$6,120	$536,000	$0	$0	$542,000
	Coal Mining Permit Review	0 - 6 Technical Assistance Efforts	Low	$0	$0	$0	$0	$0
			High	$60	$0	$9,000	$0	$9,060
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	NPDES Permit Review	1 - 3 Technical Assistance Efforts	Low	$10	$0	$600	$0	$610
			High	$30	$0	$4,500	$0	$4,530
12- Marsh Creek	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (NRCS)	2 - 4 Formal Consultations	Low	$1,520	$21,000	$5,800	$0	$28,300
			High	$18,200	$52,400	$16,400	$0	$87,000
	Agriculture (NRCS)	8 - 15 Informal Consultations	Low	$496	$25,100	$12,300	$0	$37,900
			High	$930	$47,100	$23,100	$0	$71,100
	National Forest Activities (USFS)	0 - 3 Formal Consultations	Low	$0	$0	$0	$0	$0
			High	$15,100	$63,700	$0	$0	$78,800
	National Forest Activities (USFS)	36 - 33 Informal Consultations	Low	$1,470	$185,000	$0	$0	$186,000
			High	$6,120	$536,000	$0	$0	$542,000

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	NPDES Permit Review	1 - 3 Technical Assistance Efforts	Low	$10	$0	$600	$0	$610
			High	$30	$0	$4,500	$0	$4,530
13- Laurel Fork	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	Agriculture (NRCS)	10 Informal Consultations	Low	$620	$31,400	$15,400	$0	$47,400
			High	$620	$31,400	$15,400	$0	$47,400
	Coal Mining Permit Review	0 - 6 Technical Assistance Efforts	Low	$0	$0	$0	$0	$0
			High	$60	$0	$9,000	$0	$9,060
	Utilities (USACE)	1 - 2 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$380	$7,800	$19,000	$0	$27,200
	NPDES Permit Review	3 - 5 Technical Assistance Efforts	Low	$30	$0	$1,800	$0	$1,830
			High	$50	$0	$7,500	$0	$7,550
1- French Broad	Road and Bridge Construction (TDOT)	5 - 10 Formal Consultations	Low	$3,800	$19,500	$47,500	$9,000	$79,800
			High	$45,400	$65,000	$107,000	$150,000	$367,000
	Road and Bridge Construction (TDOT)	15 - 20 Informal Consultations	Low	$450	$19,500	$18,000	$27,000	$65,000
			High	$3,800	$78,000	$190,000	$300,000	$572,000
	Road and Bridge Construction (USACE)	1 - 2 Informal Consultations	Low	$0	$0	$0	$0	$0
			High	$380	$7,800	$19,000	$0	$27,200

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Agriculture (TVA/USACE)	35 Informal Consultations	Low	$1,050	$17,500	$42,000	$0	$60,600
			High	$6,650	$17,500	$102,000	$0	$126,000
	Gravel Dredging (USACE)	0 - 1 Formal Consultation	Low	$0	$0	$0	$0	$0
			High	$4,540	$6,500	$10,700	$0	$21,700
	Utilities (USACE)	1 - 5 Informal Consultations	Low	$30	$1,300	$1,200	$0	$2,530
			High	$950	$19,500	$47,500	$0	$68,000
	Utilities (TVA)	10 Informal Consultations	Low	$300	$5,000	$0	$10,000	$15,300
			High	$300	$5,000	$0	$10,000	$15,300
	Conservation/ Recreation (TVA)	15 Informal Consultations	Low	$450	$7,500	$18,000	$0	$26,000
			High	$2,850	$7,500	$43,500	$0	$54,000
	NPDES Permit Review	2 Technical Assistance Efforts	Low	$20	$0	$1,200	$0	$1,220
			High	$20	$0	$3,000	$0	$3,020
2- Holston	Road and Bridge Construction (TDOT)	3 - 4 Formal Consultations	Low	$2,820	$11,700	$28,500	$5,400	$47,900
			High	$18,200	$26,000	$42,800	$60,000	$147,000
	Road and Bridge Construction (TDOT)	12 - 16 Informal Consultations	Low	$360	$15,600	$14,400	$21,600	$52,000
			High	$3,040	$62,400	$152,000	$240,000	$457,000
	Road and Bridge Construction (USACE)	1 - 3 Informal Consultations	Low	$0	$0	$0	$0	$0
			High	$570	$11,700	$28,500	$0	$40,800
	Agriculture (NRCS)	3 Informal Consultations	Low	$186	$9,420	$4,620	$0	$14,200
			High	$186	$9,420	$4,620	$0	$14,200

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	Agriculture (TVA/USACE)	28 Informal Consultations	Low	$840	$14,000	$33,600	$0	$48,400
			High	$5,320	$14,000	$81,200	$0	$101,000
	Utilities (USACE)	5 - 18 Informal Consultations	Low	$150	$6,500	$6,000	$0	$12,600
			High	$3,420	$70,200	$171,000	$0	$245,000
	Utilities (TVA)	8 Informal Consultations	Low	$240	$4,000	$0	$8,000	$12,200
			High	$240	$4,000	$0	$8,000	$12,200
	Conservation/ Recreation (TVA)	12 Informal Consultations	Low	$360	$6,000	$14,400	$0	$20,800
			High	$2,280	$6,000	$34,800	$0	$43,100
	NPDES Permit Review	2 Technical Assistance Efforts	Low	$20	$0	$1,200	$0	$1,220
			High	$20	$0	$3,000	$0	$3,020
3- Rockcastle	Road and Bridge Construction (KTC)	4 Formal Consultations	Low	$3,040	$15,600	$38,000	$400,000	$457,000
			High	$18,200	$26,000	$42,800	$400,000	$487,000
	Road and Bridge Construction (USACE)	0 - 1 Informal Consultation	Low	$0	$0	$0	$0	$0
			High	$190	$3,900	$9,500	$0	$13,600
	National Forest Activities (USFS)	103 Informal Consultations	Low	$3,480	$471,000	$0	$0	$475,000
			High	$19,500	$1,690,000	$0	$0	$1,710,000
	Coal Mining Permit Review	2 Technical Assistance Efforts	Low	$20	$0	$1,200	$0	$1,220
			High	$20	$0	$3,000	$0	$3,020
	Utilities (USACE)	0 - 1 Informal Consultation	Low	$0	$0	$0	$0	$0
			High	$190	$3,900	$9,500	$0	$13,600

TOTAL COSTS FOR THE MUSSELS (OVER TEN YEARS)								
Unit/Area	**Activity (Action Agency)**	**Section 7 Impact**	**Range**	**Costs to the Service**	**Costs to the Action Agency**	**Costs to Third Parties**	**Project Mods**	**Total Section 7 Costs**
	NPDES Permit Review	28 - 33 Technical Assistance Efforts	Low	$280	$0	$16,800	$0	$17,100
			High	$330	$0	$49,500	$0	$49,800
Unassigned	Water Quality Activities (USEPA)	2 Formal Consultations	Low	$1,520	$7,800	$11,800	$70,000	$91,100
			High	$9,080	$13,000	$33,400	$100,000	$155,000
	Water Quality Activities (USEPA)	22 - 36 Informal Consultations	Low	$660	$28,600	$92,400	$105,000	$227,000
			High	$6,840	$140,000	$558,000	$150,000	$855,000
	Programmatic Consultation (TVA)	1 Formal Consultation	Low	$760	$5,000	$0	$0	$5,760
			High	$4,540	$5,000	$0	$0	$9,540
	Private Landowner Assistance	100 Technical Assistance Efforts	Low	$1,000	$0	$60,000	$0	$61,000
			High	$1,000	$0	$150,000	$0	$151,000
		TOTAL COSTS	**Low**	**$94,000**	**$2,400,000**	**$1,690,000**	**$1,800,000**	**$5,980,000**
			High	**$636,000**	**$6,470,000**	**$5,530,000**	**$3,340,000**	**$16,000,000**

Source: Based on conversations with Federal agencies potentially affected by the proposed critical habitat designation.
Notes: Estimates may not sum due to rounding, have been rounded to three significant digits.